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Email: editor@caucasushealth.ge

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University of Georgia
School of Health Sciences and Public Health

II Student Conference:
Current Issues of Health Sciences

P r o g r a m

Tbilisi
June 21, 2017

Organizing Committee / Student's Scientific Board:
Georgian sector: Lasha Khvedelidze (President), Ivane Burjanadze (vice-president), Eka Kobaladze (Scholarly secretary)
English sector: Khaleel Ahmed Nazar Khaleel (President),Ali Abduljaleel Ali (Vice-president)

Scientific Consultants: **Vasil Tkeshelashvili, Elza Nikoleishvili**

The University of Georgia, Building I, School of Health Sciences and Public Health

10:00-11:00– Second Floor: Registration of conference participants

11:00-12:00- Auditorium 204: The Opening Ceremony of the Conference
Greeting: Rector of The University of Georgia- **Kontantine Topuria**
Development prospects of School of Health Sciences and Public Health, School Dean –**Tamar Lobjanidze**
Plenary Presentation: Telemedicine: Present and Future- professor **Nikoloz Pruidze**

12:00-13:00- "Welcome" Buffet

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13:00-14:30 - Parallel Sessions of Conference:

Session 1
Auditorium: 305

Chairmen: Ioseb Abesadze, Giorgi Gabunia
Coordinator: Tina Samkharadze

#	Presentations:	Speakers	Reglament (min)
1	Characteristics of Prostate Cancer Screening Management in Tbilisi in 2015-216	Mari Tvaliashvili	10
2	Lung Cancer Prevalence, Risks and their Management	Eka Topuria	10
3	Liver Cancer Prevalence, Risks and their Management	Mariam Nadareishvili	10
4	Breast Cancer Prevalence, Risks and their Management	Rusudan Shubitidze,	10
5	Acute myocardial infarction - epidemiology, risk factors and management	Akaki Kapanadze	10
∑	***Questions, Discussion, Summary of the Section***		40

Session 2
Auditorium: 307

Chairmen: Nata Kazakhashvili, Teona Salukvadze
Coordinator: Lasha Khvedelidze

#	Presentations:	Speakers	Reglament (min)
1	Multi-Causal Phenomenon of Preterm Delivery	Natia Kvaratskhelia	10
2	The role of primary care in maternal and child health care	Nana Jincharadze	10
3	Stillbirth frequency, risks and their management	Ivane Burjanadze	10
4	Mother and child mortality	Irina Kandelaki	10
5	Abortions and Caesarian section frequency, risks and their management	Eka Kobaladze, Tinatin Samkharadze	10
6	Maternal mortality in Georgia, causing causes, risks and their management	Lasha Khvedelidze	10
∑	***Questions, Discussion, Summary of the Section***		30

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Session 3
Auditorium: 309

Chairmen: Ramaz Urushadze, Otar Vasadze, Otar Toidze
Coordinator: Eka Kobaladze

#	Presentations:	Speakers	Reglament (min)
1	Impact of Socio-Economic Background and Dental Service Deficit on the Oral Health of the Population of High Mountain Regions of Georgia	Nutsa Zurabiani	10
2	How the demographic indicators of Georgia have changed	Dea Baghaturia	10
3	HIV AIDS and ethical aspects of its treatment	Veronika Tsetskhladze	10
4	Euthanasia - murder or humanity	Salome Akhalaia	10
5	The importance of implementing harm reduction programs in the framework of C hepatitis elimination program	Marina Chokheli	10
6	Is a fluorinated drinking water safe?	Megi Sharashenidze, Nino Sharashenidze	10
∑	***Questions, Discussion, Summary of the Section***		20

Session 4
Auditorium: 203

Chairmen: David Topuria, Ketevan Nanobashvili, Lia Tsiklauri
Coordinator: Ivane Burjanadze

#	Presentations:	Speakers	Reglament min)
1	Toxic Effects of Heavy Metals on the Human Organism	Tophuria Davit	10
2	Cooperation of liver cells in health and disease	Kakhniashvili Inga	10
3	Structure activity relationship of biologically active flavonoids	Marwan Mohanad Tawfeeq	10
4	Biovailability and Metabolism of Flavonoids	Oladoye Oluwole Olawale, Oyesiji Rilwan Oyebamiji	10
5	Facial fractures	Vahidreza Rezaee Hassanabadi	10
6	Dental Caries	Ali Makki Hameed	10
∑	***Questions, Discussion, Summary of the Section***		30

15:00-16:00- Conference Closing Ceremony
Auditorium: 204
Conference Summary Report- Tamar Lobjanidze
Rewarding of participants
16:00- Completion

The Impact of the Socioeconomic Background and Dental Service Deficit on Oral Health of the Population in High Mountainous Regions of Georgia

Nutsa Zurabiani[1], Mariam Margvelashvili[2], Vasil Tkeshelashvili[3]

The University of Georgia, the School of Health Sciences and Social Health
[1]PhD student, Public Health; [2]Supervisor, PhD, Associated Professor; 3Supervisor, MD, JD, PhD, ScD, Professor

Summary

In Georgia, particularly in the population of its high mountainous regions, the dental diseases still remain to be an actual issue. It is not yet established the structure of the dental diseases, the prevalence of general diseases and their causing reasons. The study was performed in high mountainous regions of Georgia, namely in Svaneti, Racha and high mountainous villages of Samegrelo. All in all, 614 people were investigated (in Svaneti – 208, Racha – 202, Samegrelo – 204 people) in 5 age groups, as delivered by the International Organization of Health: (35 – 44y.o.) – 221 people, (45 – 54y.o.) – 152 people, (55 – 64y.o.) – 124 people, (65 – 74y.o.) – 66 people, (74 – 85y.o.) – 51 people. On the whole, 269 men and 345 women were investigated. The population Survey and dentistry investigation have been performed. The sociological questionnaire, made by us, consisted of questions to detect the risk factors: social status and financial income of the family, presence of some diseases, people's attitude towards the habits of oral hygiene (cleaning teeth, usage of dental floss and oral rinse), affordability of dentistry, dental activity of the population, smoking, consumption of meat, milk and other products. The dentistry status of the population was assessed on the basis of the WHO methodology. The oral cavity investigation was performed in natural lighting conditions, using the dentistry mirror, dental zond and parodontal zond (CPI) (to measure the parodontal pockets). We performed the Caries diagnosing and registration using DMFT index, stated by the WHO that means the sum of the caries, extracted and filled teeth. As the result of investigation of three regions, we found that the caries spread and intensity is extremely high. The inhabitants of lower Svaneti region indicated that there were no dentistry institutions in villages. Furthermore, there was also the deficit of service and in case of pain they had to visit the Imereti or Tbilisi that is linked with the financial and time problems. The same reason was in Racha, namely in Ambrolauri and Samegrelo. According to the results, the low socio-economic background and absence of services in high mountainous regions significantly affects the oral diseases.

Abbreviations: *WHO – World Health Organization; DMFT index - the sum of caries, filled and extracted teeth.*

Key words: *caries spread, dentistry service, socioeconomic background, high mountainous region.*

Problems Statement:

In spite of significant success in the field of oral health, the dentistry diseases still remain to be the actual and keen problem, especially in non – privileged groups of the world population in the developed as well as in the developing countries (Tsitaishvili.L.2015).

In dentistry diseases, the most prevalent is the Tooth Caries and the Parodontal Inflammatory Diseases. In their development, the main role is played by the microbe. However, these diseases have multifactorial nature and their development is affected by a lot of local and general factors (Petersen PE, Bourgeois D, 2005). The caries development is affected by the nature of the nutrition (diet) (abundance of Carbohydrates) and the regime, quantity of salivation and its degree (Hyposalivation or Xerostomy), general diseases and conditions of the organism (they decrease the structural resistence of the dental tissues to the caries), genetic predisposition, F consistency in the drinking water, external factors, affecting the organism (radiation), smoking, poor hygiene of the mouth (existence of dental stones and plaque, Orthodontal and Orthopedic constructions of the poor quality). However, poor hygiene of the mouth is the risk-factor in the development of not only the Caries, but also the Parodontal diseases. Locally, the disease development is promoted by the low vestibule, the short ligament of the tongue and lip, short stretches of the mucosa, teeth standing and order anomalies, imperfect and incorrectly made fillings, Orthopedic and Orthodontal structures and etc. The general factors, facilitating the development of Parodontal Inflammatory diseases, include: Gastrointestinal, Endocrine, Circulatory, Haematopoietic, Nervous, Immune system diseases. (Peterson P.E. 2005).

The pain, discomfort and loss of teeth, caused by the Caries or Parodontal disease lead to functional and aesthetic disorders and hinders to the person's healthy integration in the society (Tsitaishvili.L.2015).

The Dentistry Diseases require serious professional approach and treatment to avoid further complications. In the whole world, the affordability of dentistry services is significantly low in elderly as well as in people with the poor education and income. Subsequently, the Oral Health is deteriorated in the population with the low social status. Hence, developing such social projects and programs which consider the maximum integrity of the poor and low social stratum in treatment and prevention of the Oral Diseases, is the Healthcare and State prerogative (Michael G McGrady, Roger P Ellwood, 2012).

The traditional (conventional) medical dentistry service represents the essential economic burden in the developed countries of the world, where the 5 – 10 % of the social health budget is used for treatment and prevention of the Oral Diseases (Oral helth, 2012). In the developing countries with low and medium income, the social programs of Oral Health are rare. The huge expenses of the dentistry service can be avoided by the effective prevention and the well planned prophylaxis is the essential step on the way to the disease reduction (FRANCISCO J.RAMOS-GOMEZ, 2010).

The arrangements, reducing the dentistry diseases first of all should be directed to remove risk factors. The less consumption of carbohydrates, the balanced diet, smoking reduction, perfect hygiene of the oral cavity interferes with the development and spread of the Parodontal diseases and Caries. It is also essential to maintain the optimal amount of the Fluorine on the tooth surface that is provided by the consumption of fluorinated toothpastes, rinses, drinking water, milk and salt. Delivering the optimal amount of fluorine to the organism significantly reduces the risk of Caries morbidity (Walter J. Loesche. 1996).

The certain requirements are established to assess the Dentistry morbidity. As recommended by the WHO, the condition of teeth and the Parodont are assessed at the age of 3 – for the Milk teeth, at the age of 6 – for the first Molars, at 12 – for Constant teeth and at 15 – for the Parodontal condition, at 35 – 44 and 65 – 74 both the teeth and parodont are assessed (Patel. N, 2013) .

Despite optimistic trends in frequency and severity of oral diseases of recent years, the Tooth Caries is still a very prevalent disease in the majority of countries all over the world and covers 60 – 90% of children's contingent and the big majority of adult population (Petersen PE, Bourgeois D, Ogawa H, Estupinan – Day S, Ndiaye C.,2005). In the most of developing countries, availability of dentistry aid is limited. Teeth often remain without treatment or are extracted for the reason of pain, discomfort and poverty. The loss of teeth and deteriorated functional condition of the oral cavity turns into the Social Health issue (Tsitaishvili.L 2015).

In the age group, the Acute Generalized Parodontitis ranges within 5 – 15% in various regions of the world and the presence of chronic mild and moderate forms is observed in big majority of adult population (Marulanda AM, Coral D, Sabogal D, Serrano C. 2014).]. In the industrial countries with high income, Oral Health is achieved by the medical and preventive measures and is based on private or state systems while in the developing countries, the poor people, certain ethnic minorities, the homeless, people with limited abilities and the elderly are not satisfied with dentistry services. These countries suffer the deficit of oral health service personnel. The service is mainly provided by regional or (and) urban centers and less attention is payed to prevention and restorative treatment (Nainar SM, 2001).

By the Human Development Index 0.744 (Human Development Report 2012 – 2013), the population of Georgia comes to about 4.5 million, 53% of which lives in urban areas (Gamkrelidze A. Kereselidze M, 2012).

In 1990s, for the reason of significant deterioration of the socioeconomic side, the health condition of the population dramatically changed. The health indicators were very different from the indexes of European countries. The increased consumption of cigarettes and drugs took place. High indices of smoking led to the main health issue and it was particularly prevalent in women and adolescents. The abundant consumption of alcohol and drugs was the dramatic result of disappointment and pesimism, caused by heavy socioeconomic conditions of living and unemployment (FRANCISCO J. RAMOS – GOMEZ, 2010).

Socioeconomic and political development step by step led to relative increase of medical and dentistry services and the quality of medical education and culture. Subsequently, the dentistry activity increased that significantly reduced the danger and trends of spreading the oral diseases. However, the multifactorial dentistry diseases still remain to be the actual issue in Georgia (Margvelashvili V. Tsitaishvili L. 2015).

We suppose that the very unsatisfactory socioeconomic status clarifies the less affordability of dentistry service for the population of Georgia when compared with European countries. Healthcare services are mainly funded by private insurance companies and the population itself. The WHO data of 2010 show, that 350000 people are included in private corporative insurance schedules. The state cannot finance all sorts of medical services. In general, the dentistry service is funded by private insurance companies and it refers to individuals, working in State Structures or private companies. That is why most people have to pay for their dentistry service by themselves or cannot afford it for inappropriate financial condition. This problem particularly prevails among the inhabitants of high mountainous regions. 80% of the population don't have private insurance and nor state programs function. The population of high mountainous regions is mainly busy with agriculture. The material income is very low and taking care of their oral cavity health is somewhat luxurious for them. Material conditions decrease the frequency of visits to the dentist and probability of oral sanitation that in turn deteriorates the oral health and facilitates to the development of Caries and Parodontal diseases. In addition, other risk factors also might play a role: Climato–Geographical inherited predisposition and structural inadequacy of tissues, general diseases of the organism and conditions with subsequent reduction of the immune system as well as behavioral factors whose significant role in developing oral diseases have been described in a number of Epidemiologic studies: Level of medical awareness, realizing of the necessity and importance of dentistry services for general health, nature and regimen of the diet, non-healthy lifestyle (tobacco, drugs and drinks),

patients' attitude to the habits oral care hygiene. All the above affect the development and distribution of oral diseases. Presence of high Epidemiology indicators and ignoring them will make medicosocial and economic problems to the population of Georgia in the way of frequent expectable complications and the negative impact on the organism (Kalandadze.M, 2003).

Therefore, revealing these indicators, studying and assessing them are actual challenges. Furthermore, there have been no epidemiology data for dentistry diseases for the last 24 years, in Georgia. This is especially true for high mountainous areas that hinders to the registration of the spread, frequency and intensity of such diseases as well as to detection of facilitating and provoking factors (medicobiological, climate – geographic, socioeconomic and etc.) and on the basis of the processed data, to make preventive arrangements of the dentistry diseases, which has significant practical cost in order to reduce the prevalence of the diseases.

The aim of the research:

The aim of the research was to esteblish the prevalence and the rate of general dentistry diseases in the adult population of high mountainous regions of Georgia and to make assessment of the roles of the factors, linked with socioeconomic status and the dentistry service deficit, in the disease development.

Target groups and methodology of research:

The investigation was performed in high mountainous villages of Racha and Samegrelo, regions of Georgia. All in all, 614 people have been studied (Svaneti- 208, Racha-202, Samegrelo-204 people) in five age groups, delivered by the World Health International Organization: 35-44years old – 221 people, 45-54 y.o. – 152 people, 55-64 y.o.-124 people, 65-74 y.o. – 66 people, 74-85 y.o. – 51 people. On the whole, according to the gender, 269men and 345 momen have been investigated.

The research was performed by an experienced doctor practicist – the Dentist, accompanied by 4 assistants on the basis of the informed consent of investigated individuals. The municepalities of each region was informed in advance about the goals, challenges and progress of the research study. They helped us to ensure maximal engagement during the process of people's application and their investigation.

The held arrangements consisted of quantitative as well as quality investigation components. The sociobiological questionnaire, created by us consisted of the questions to detect risk-factors: Social status and material income of the family, presence of certain diseases and people's attitude to the habits of hygiene of oral healthcare (such as cleaning teeth, use of dental floss and oral rinse), affordability of dentistry aid, dentistry activity of population, smoking, consumption of meat, dairy and other products.

The dentistry status of the investigated population was assessed on the basis of WHO methodology (WHO – ''Oral Health Assessment Form 2013''). The oral cavity was investigated in conditions of natural lighting, using the dentistry mirror, dental zond and parodontal zond (CPI) (to measure parodontal pockets).

We performed the diagnosing and recording using the Caries intensity DMFT index, delivered by WHO which means the sum of caries, extracted and filled teeth [6]. (Levin L, Margvelashvili V, 2013).

According to the questionnair and data of dentistry investigation, the electronic base of the data was formed, which was processed statistically using the program packet SPSS.21. Obtained results were presented for analysis as schedules and charts.

Research results:

In high mountainous regions of Georgia, the indicator of Caries prevalence is significantly high (see schedule #1).

Prevalence of Tooth Caries by regions

Region	Prevalence for 1000 inhabitants
Svaneti	947 %0
Racha	980%0
Samegrelo	1000%0

Caries intensity is very high as well in all three regions by the DMFT index.

Tooth Caries intensity by regions

Region	DMFT index	p
Svaneti	12.56 ± 9.541	<0.05
Racha	9.67 ± 9.153	<0.05
Samegrelo	10.36 ± 8.262	<0.05

It is worth to point out that the indicator of Caries intensity increases (see schedule # 3).

Schedule 3. Caries Intensity by age groups

Age		N	Mean	Std. Deviation	Std. Error Mean
35-44 y.o.	Age	221	1.00	.000[a]	.000
	DMFT	221	6.52	5.576	.375
45-54 y.o.	Age	152	2.00	.000[a]	.000
	DMFT	152	10.01	7.881	.639
55-64 y.o.	Age	124	3.00	.000[a]	.000
	DMFT	124	12.08	9.317	.837
65-74 y.o.	Age	66	4.00	.000[a]	.000
	DMFT	66	17.98	9.882	1.216
75-84 y.o.	Age	51	5.00	.000[a]	.000
	DMFT	51	20.27	9.900	1.386

Careful attention must be paid to the employment issue of the population of high mountainous regions, which will then be reflected by the socioeconomic status.

64% of the investigated people have profession, 39% are employed. Remaining 61% are unemployed. The 13% of the latter are busy with agriculture.

On the basis of the survey, we assessed what was the the rate of application to the dentist and what was the reason, explained by people. The impact of application rate on the Caries Intensity was also assessed (see schedule #4).

Schedule #4. Impact of dentistry application on Caries intensity

Application	DMFT index	P
For the last 1 year	8.98 = 7.534	< 0.05
Long time age	13.21 = 10.285	< 0.05
Have never applied	6.07 = 7.383	< 0.05
Don't remember	16.46 = 9.121	< 0.05

The majority of the investigated people indicated that the application rate to the dentist was caused by pain, much more rarely – by the reason of prosthesing and checking up (see schedule #5).

Schedule #5. Reason for visiting the dentist

Application		Freq.	%
For the last one year	Pain	243	73.9
	In order to check up	37	11.2
	For prosthesing	49	14.9
	On the whole	329	100.0
Long ago	Pain	141	68.1
	For check up	10	4.8
	For prosthesing	48	23.2
	Don't remember	7	3.4
	Have not applied	1	.5
	On the whole	207	100.0
Never applied	Pain	1	3.6
	For prosthesing	1	3.6
	Don't remember	2	7.1
	Have not applied	24	85.7
	On the whole	28	100.0
Don't remember	Pain	36	72.0
	For ckeck up	2	4.0
	For prosthesing	10	20.0
	Don't remember	2	4.0
	On the whole	50	100.0

Despite the Caries prevalence and intensity, the visit to the dentist is very rare in population of high mountainous regions. As the result of investigation, we found that its reason is first of all, financial problem and then the deficit of dentistry service in the inhabited areas and regions of high mountains. The last, unimportant reason was the fear (See schedule #6).

Schedule #6. Reason for not applying to the dentist

Reason	frequency	%
No clinic	285	46.41
Have never suffered	43	7.00
Financial problem	233	37.95
No quality service	36	5.86
Fear	17	2.77

On the basis of the investigation, it was stated that the more part in DMFT index belongs to the extracted teeth. As mentioned above, the majority of the investigated people, applied to the dentist in case of pain and for the reason of poverty, they had to extract those teeth which could be cured. It is well known that it is much more cheeper to have your tooth pulled out than to treat it (see schedule #7).

Schedule #7. The portion of each component in DMFT index (p< 0.05)

	N	Mean	Std. Deviation	Std. Error Mean
Damage	614	2.29	3.175	.128
Filling	614	.33	1.038	.042
Extracted	614	8.25	9.340	.377

DMFT index components	Frequency
Caries	48 %
Filling	14.5 %
Extracted	80.9 %

Conclusion:

As the result of the investigation of all three regions, we established that the Prevalence and Intensity of Caries is extremely high. The inhabitants of Lower Svaneti region indicated that no dentistry institutions were located in villages. Moreover, in the cery center of the region, there was the service deficit and in case of pain, they had to visit the Imereti regions or Tbilisi, that was linked with Financial and time problems. The same was the reason in Racha, namely in Ambrolauri region and Samegrelo. According to the results, received by us, low socioeconomic background and absence of services have significant impact on Oral Diseases.

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Increased HIV Case Detection through Integration of HIV Testing in Georgian Hepatitis C Elimination Program Screening Activities

Maia Alkhazashvili[1], Davit Baliashvili[2], Maia Tsereteli[3], Ketevan Stvilia[4], Amiran Gamkrelidze[5]

National Center for Disease Control, Tbilisi, Georgia
[1]MD, Deputy Head of Regional Public Health Department; [2]MD, MS, MPH Department of Communicable Diseases; [3]MD, PhD, Head of Department HIV/AIDS, Hepatitis, STI & TB; [4]MD, PhD Global Fund HIV/AIDS program Manager; [5]MD, PhD, Professor, Director General

Summary

In 2015 Georgia launched unprecedented National Hepatitis C Elimination Program, aiming to dramatically decrease HCV prevalence in the country by 2020. Currently seroprevalence of HCV infection in Georgia is 7.7%, based on the results of the population based cross-sectional household serosurvey, "Identify Persons infected with HCV" is one of the strategic directions of the 5-year Strategic Plan for The Elimination of Hepatitis C Virus in Georgia, developed in 2016. To increase the proportion of persons who know their HCV infection status, the HCV screening component has been added to the Hepatitis C Elimination program since June, 2016. Georgia announced free of charge screening for any citizen of Georgia who wants to know status, irrespective of risk factor. In addition, tandem testing on HIV infection was offered to every person willing to be tested for HCV. The tests were granted by the Global Fund to fight AIDS, TB and Malaria. Starting from November, 2015, any citizen of Georgia can obtain free HCV and HIV testing at the National Center for Disease Control and Public Health including its regional branch. Both HIV and HCV testing are performed by rapid immune chromatographic tests. 67,484 voluntary HCV testing and 29,765 HIV testing were performed at NCDC and its regional network. Rate of positive HCV test result was 18%. Rate of positive HIV test result was 0.3% (84 out of 29,765). Out of 84 volunteers who tested positive, further diagnostic procedures confirmed HIV in 42 and all of them are enrolled in the HIV treatment program. Considering the low prevalence of HIV in Georgia, extra cases found by the combined screening approach was significant contribution for early detection of asymptomatic HIV cases. Nationwide HCV elimination program appears to be an effective mechanism that can be used to increase case detection of HIV in Georgia and Integration of HIV testing within HCV screening should be maintained and expanded.

Abbreviations: *HCV -Hepatitis C virus; HBV- Hepatitis B virus; HIV- human Immunodeficiency Virus, DAA- Direct Acting Antivirals, PWID- persons who inject drugs, RT-PCR- Real Time Polymerization Chain reaction, CDC-US Centers for Disease Control and Prevention, NCDC-National Center for Disease Control and Public Health .*

Key words: *screening, Elimination, HIV.*

Introduction

Globally, there are an estimated 170 million people living with hepatitis C virus (HCV) and more than 700,000 people die every year of HCV-associated hepatic diseases. With an HCV prevalence of 7.7% and an estimated 150,000 persons living with chronic HCV infection, HCV transmission and mortality is considered epidemic in certain populations of the world. For instance, a concentrated epidemic is occurring in high-risk populations (e.g., persons who inject drugs [PWID]) in most developed countries (e.g., the United States and those in Western Europe) and is becoming a major source of infection in developing countries and those with transitional economies, accounting for 40% or more of cases globally .

Some countries with high HIV prevalence rates are also experiencing an HCV epidemic involving persons who are co-infected with HIV. Rates of HIV/HCV co-infection are highest in areas where injection-drug use is a major route of HIV transmission. The extent to which other countries are experiencing similarly high rates of HCV infection is unknown, as there is a dearth of reliable epidemiologic data globally; for some countries, there are no data available at all.

Georgia has one of the highest burdens of HCV infection in the world. Because of the acute infection is often asymptomatic, most persons remain unaware of their infection status until decades later, when they experience life-threatening complications.

In response to this HCV epidemic, the Government of Georgia committed to eliminating HCV in their country by 2020, defined as 90% reduction in infection prevalence, a goal that is now achievable due to the recent availability of highly effective, direct acting antivirals (DAAs) capable of curing >90% of persons treated. In addition, the country proposed additional elimination goals: a) testing 90% of HCV-infected persons for their infection; b) treating 95% of people with chronic HCV infection; and c) curing 95% of persons treated of their HCV infection.

Currently seroprevalence of HCV infection in Georgia is 7.7%, based on the results of the population based cross-sectional household serosurvey, conducted in 2015 by the

NCDC of Georgia in collaboration with the CDC to determine the prevalence of HCV and hepatitis B virus (HBV) infection in the country. "Identify Persons infected with HCV" is one of the strategic directions of the 5-year Strategic Plan for The Elimination of Hepatitis C Virus in Georgia, developed in 2016.

Coordinated by different programs depending on the target population, HCV testing had been conducted in Georgia before the start of the HCV Elimination Program in April 2015.

- ◊ National Safe blood program: free of charge HCV screening for all blood donors since 1997;
- ◊ The State HIV program has supported HCV testing among people living with HIV since 1997;
- ◊ Global Fund program covered HCV screening for people who has been injecting drugs since 2011;
- ◊ HCV related program in penitentiary system has being implemented since 2014;
- ◊ All military people go through the routine medical checkup including HCV testing first time before contracting and then once in every 4 years;
- ◊ All young Recruits are undergoing Medical examination including HCV screening.

After starting HCV Elimination program HCV Screening for pregnant women has been integrated into Mother and Children Health State Program since December, 2015
In May 2015, the Tbilisi Municipality launched an HCV testing program for all persons wanting to know their status regardless of their risk.
Data on HCV screening from self-referrals among people who paid out of pocket at facilities, not supported by specific HCV-related programs are not available. Overall, HCV testing coverage needs to be significantly expanded to accelerate detection of HCV cases.

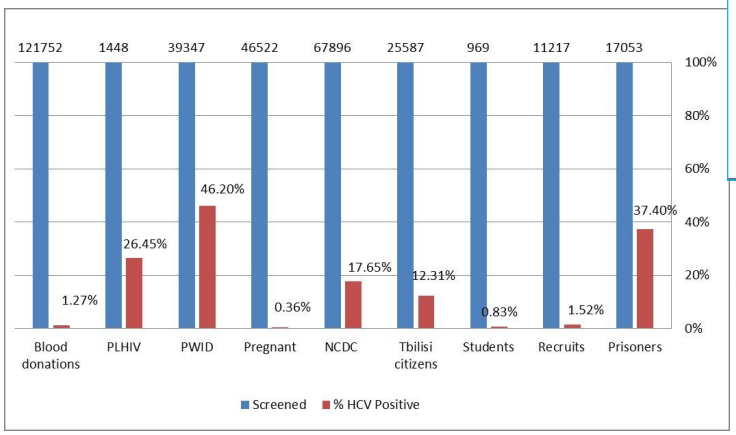

Figure 1. HCV screening statistic among different target groups (2015-Sep.2016)

To increase the proportion of persons who know their HCV infection status, the HCV screening component has been added to the Hepatitis C Elimination program since June, 2016. And at the same time Georgian Government released Decree on „ Improvement of technical regulations on high-risk medical activities" and according to this Decree from November 1st, 2016 hospitals are responsible to provide HCV screening of all hospitalized patients.

Georgia announced free of charge screening for any citizen of Georgia who wants to know status, irrespective of risk factor. In addition, tandem testing on HIV infection was offered to every person willing to be tested for HCV. The tests were granted by the Global Fund to fight AIDS, TB and Malaria.

The objective of this programmatic approach was to use the opportunity generated by HCV screening program to improve HIV case detection in general population by tandem testing strategies.

Methodology

Georgia has well-developed public health laboratory infrastructure, the nationwide Laboratory network of NCDC, that is spread throughout the country: National Reference Laboratory (Lugar Center) is located in Tbilisi, 2 Zonal Diagnostic Laboratories [ZDLs] are in Adjara (Batumi) and Imereti (Kutaisi) and Seven Laboratory Support Stations [LSSs] are located in different regions of Georgia: Kakheti, Shida Kartli, Samtskhe-Javakheti, Guria, Racha, Samegrelo – Zemo Svaneti regions and the port of Poti.

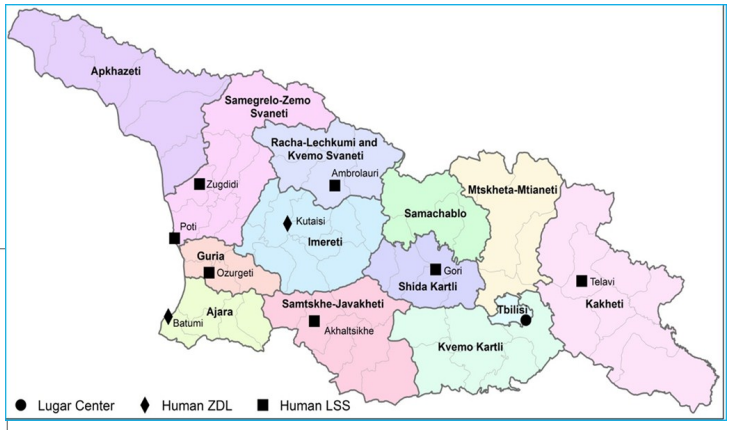

Figure 2. National public Health Laboratory Network of Georgia

Considering that NCDC laboratory network is very well equipped and staffed and has a significant outreach to every corner of the country, it is effectively used to conduct screening. Starting from November, 2015, any citizen of Georgia can obtain free HCV and HIV testing at the National Center for Disease Control and Public Health.

	HIV		
	Total	Positive	Positive (%)
Total	**29 765**	**84**	**0,3%**
Tbilisi	**5 473**	**12**	
Mobile laboratories	**2 974**	**11**	
Adjara	**2 837**	**6**	
Guria	**766**	**3**	
Imereti	**3 035**	**17**	
Kakheti	**1 520**	**1**	
Racha-Lechkhumi-kvemo Svaneti	**450**	**0**	
Samegrelo-Zemo Svaneti	**4 030**	**11**	
Samtskhe-Javakheti	**2 479**	**6**	
Sida Kartli	**2 839**	**10**	
Mtskheta-Mtianeti	**616**	**2**	
Kvemo Kartli	**2 746**	**4**	

Both HIV and HCV testing are performed by rapid immunochromatographic tests by different vendors (Biotech, Biotek, Intec). RT-PCR for HCV viral load was used for confirming active HCV disease and Immunoblot was used for HIV confirmation.

For the assessment of the results was used combination of quantitative and qualitative data.

Results:

Through November, 2016, 67,484 voluntary HCV testing and 29,765 HIV testing were performed at NCDC and its regional network.

Rate of positive HCV test result was 18%. All positive cases were referred to HCV treatment component of National Elimination Program

Figure 2. Hepatitis C Screening statistic conducted by NCDC (November, 2015 - November, 2016)

Rate of positive HIV test result was 0.3% (84 out of 29,765) which is well corresponds to the national estimates for HIV prevalence among the General population in the country – 0.26%.

Detection of HIV screening positive results in the regions within this program is aligned with the Geographic distribution of registered HIV cases in Georgia according to which the largest number of cases are detected in Tbilisi (35%) followed by Samegrelo-Zemo Svaneti region (13%), Imereti (13%) and Ajara (12%).

Out of 84 volunteers who tested positive, further diagnostic procedures confirmed HIV in 42 and all of them are enrolled in the HIV treatment program.

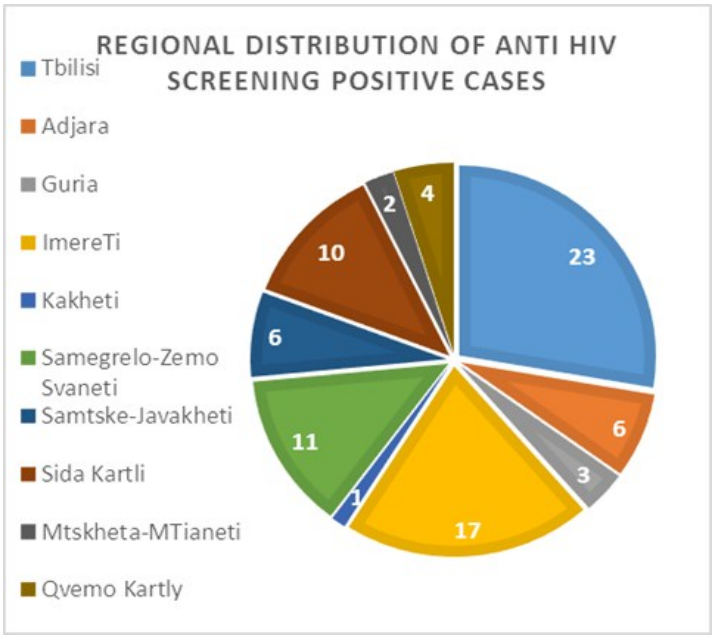

Figure 3. Regional distribution of anti HIV screening positive cases

Discussion:

Free of charge HIV testing was offered only for high-risk groups until 2015.

Preliminary results from combined testing indicates that HIV prevalence in general population remains low.

Considering the low prevalence of HIV in Georgia, extra cases found by the combined screening approach was significant contribution for early detection of asymptomatic HIV cases.

Nationwide HCV elimination program appears to be an effective mechanism that can be used to increase case detection of HIV in Georgia and Integration of HIV testing within HCV screening should be maintained and expanded.

Acknowledgements:

The authors thank the Georgian residents who participated in the voluntary screening and The Global Found to fight AIDS, TB and Malaria for their technical support. In addition, we thank Personnel of the Infectious Diseases, AIDS and Clinical Immunology Research Center and Regional laboratories of NCDC for completing the laboratory testing within the Tandem Testing Strategy.

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Youth Health Status and Preventive Medicine

Tinatin Manjavidze[1], Nata Kazakashvili[2], Nato Pitskhelauri[3], Lasha Loria[4], George Lobzhanidze[5], Nino Chikhladze[6]

Ivane Javakhishvili Tbilisi State University, Faculty of medicine, Department of Public Health
[1]MPH, PhD student; [2]Supervisor, MD, PhD, Associate Professor; [3]MD, PhD; [4]Supervisor, MD, PhD, Associate Professor; [5]PhD student, MD; [6]Supervisor, MD, PhD, Associate Professor.

Summary:

Aim: The aim of our study was to assess the level of students' awareness of health and health rights and attitude toward prevention and healthy lifestyle.
Methodology: A questionnaire has been developed and randomly selected 700 students of Tbilisi State University have been interviewed in summer 2016. 654 fully answered questionnaires were analyzed.
Results: The study showed that the majority of students (71%) have a positive assessment of their health and do not visit medical institutions for preventive examinations (68%). One third of students (33%) do not see a need for preventive measures at all. Most of the students do not participate in any sports (74%), 68% has unhealthy diet and every third student uses tobacco (32%). Most students do not have information about the health insurance and therefore do not use student health insurance (69%).Most students feel that they do not have complete information about their health (77%) and lack of information about their rights to health (81%), although they are interested in medical and health-related legal issues.
Conclusion: Many students face financial problems while taking medical care, reason is young people are not adequately informed about their health insurance.Most youth polled did not have complete information about their health, however, are interested in health-related issues.

Keywords: *Youth health, health promotion, health insurance.*

Introduction:

Young people's health is the fundamental of the well-being of the country. This is socially active and reproductive group, which mainly determines the future of the country and its socio-economic development. In youth period ends human mental and physical development, resulting in forming the basic skills and abilities, which are the cornerstone of the success in their future work and life. The health status and needs of the youth is of country's healthcare policy (1). On March 28, 2014, the Georgian Government has approved the revised document of the state youth policy, according to which the concept of "young" as defined in the European Union was formed and includes 15-29 years aged individuals (2).

The need for more activities in youth healthcare has been voiced by numerous international organizations and health-oriented societies. Young people's right to health is proved by international legal documents. Adolescents and youth reproductive health and awareness on these issues are specially emphases around the world. Given the fact that people in their 20-24 has the highest rate of sexually transmitted diseases and the lowest rate of contraceptive use (3).

According to WHO latest data, main causes of deaths of young people are: traffic injuries, HIV infection, Suicide, Lower respiratory tract infections, violence. All these issues require particular attention in terms of reducing the mortality rate of the young people (4).

Due to the importance of the problem development and implementation of national strategies and programs on children and young people's health has been recognized on the special session UN General Assembly. Attention should be paid primarily by adult's health and protection of their rights, social adaptation; priorities for the government of different countries were identified to achieve better health for young people (5).

In close cooperation with the government sector, health and social conditions of the youth were led by United Nations Population Fund and UNICEF, to form a common vision about youth, their roles and needs; this should develop the necessary mechanisms for the young people's future progress.

National Statistical Service with the technical support of the Ministry of Sport and Youth Affairs, National Center for Disease Control (NCDC), The United Nations Children's Fund (UNICEF) and United Nations Population Fund (UNFPA) National Youth Survey was conducted in 2014 and respective report was prepared covering the situation and needs of young people in Georgia. Healthcare was the one of the five essential thematic parts of the research. It once again shows the importance of young people's healthcare issues (6).

In addition to the above mentioned problems, there is a significant difference in the mortality rate among young people. The overall population mortality rate among men is 1.2 times higher than the same figure for women; for the 15-24 age group the death rate among men is four times higher than in women.

The importance of the issue derives from the fact that in youth most of the causes of death are preventable and diseases developed in this age continues throughout life. These problems can be divided into the following groups: early and unplanned pregnancy; sexually transmitted infections; HIV infection; Mental problems; Road traffic accidents; Violence / suicide; Drug addiction; Tobacco and alcohol use; unhealthy diet (7).

Many chronic diseases, that affect quality of life, take start in this age and therefore, in order to improve health of general population, special care should be taken on adolescence and students. Therefore, with consideration of all this small-scale research was planned and carried out on "student's opinions and needs of health care issues."

The proportion of 15-29 old population in Georgia is 22.5% of the total population. The total number of students is 138,900, accounting for 3.72% of the population. 10.1% of 15-29 year young people people study at higher education institutions.

The aim of the study:

has been to assess the level of students' awareness of health and health rights and attitude toward prevention and healthy lifestyle.

Methods:

A questionnaire has been developed and randomly selected 700 students of Tbilisi State University have been interviewed in summer 2016.

654 fully answered questionnaires were analyzed.

Results:

The study involved 18-29 year old students. The study showed that the majority of students (71%) have a positive assessment of their health and do not visit medical institutions for preventive examinations (68%). One third of students (33%) do not see a need for preventive measures at all.

On the question of how often you visit a medical institution, 52% of respondents answered that very rarely, 41% 1-2 times a year, and 7% monthly visits to the medical institution. When asked what kind of problem they faced during medical care the majority of respondents (41%) cited financial issues, 19% - unacceptable attitude of the medical staff, 15% - insufficient time for the visit, 6% has not any problems visiting medical facility, 1.3% -1.3% - unorganized lines and the language barrier, lack of professionalism of the doctors was surveyed in 2.5%. Question of whether or not you are taking medication prescribed by a doctor, 53% of students answered positively, 43.5% practices self-treatment; both answers are positive for 3.5 % respondents.

Most of the students do not participate in any sports (74%), 68% has unhealthy diet and every third student uses tobacco (32%). Most necessary health care services for students are in the field of therapy, gynecology, urology and dentistry. Most students do not have information about the health insurance and therefore do not use student health insurance (69%).

Source of medical information is Internet and TV for 65%, and about one-third receives medical information from health care providers.

Most students feel that they do not have complete information about their health (77%) and lack of information about their rights to health (81%), although they are interested in medical and health-related legal issues.

Most students (85%) said that the university environment does not provide sufficient information about the health in general, reproductive health and unhealthy habits, although they wanted it was possible (through campaigns, events, news of the university website).

Most students (73%) expressed their willingness to participate in the planned activities of the university to promote a healthy lifestyle.

Conclusion:

The majority of students do not have information about health insurance, thus not uses the student health insurance (68%). Many students face financial problems while taking medical care, reason is young people are not adequately informed about their health insurance. Preventive examination has less importance for young people and they never visit medical facilities, more than a third do not see the necessity of preventive measures at all. At the same time, the students are not aware of their rights in the health sector; they even do not know that healthcare may be governed by laws. Most youth polled did not have complete information about their health, however, are interested in health-related issues.

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Characteristics of Prostate Cancer Screening Management in Tbilisi

Mari Tvaliashvili[1], Tamar Lobjanidze[2], Vasil Tkeshelashvili[3]

The University of Georgia, School of Health Sciences and Public Health
[1]Bachelor Student, Health Care Administration; [2]Supervisor, Dean of the School; [3]Supervisor, MD, JD, PhD, ScD, Professor

Summary

According to the GLOBOCAN / IARC (2012) data, an estimated 1.1 million men worldwide are diagnosed with prostate cancer annually and 307,000 males die for the same reason. We conducted a descriptive epidemiological study. In 2015-2016, according to Crude Rate 35 per 100,000 men suffered from prostate cancer annually. ASR-27.3. The rate of prostate cancer sharply increases from the age of 55-59 and reaches peak levels in 75-79 age group (299.3‰ -301.7‰). Prostate cancer age standardized rate in Tbilisi population was compared with the similar data of European and Asian cities. According to TASR 225 per 100,000 men at the age of 60-79 years were diagnosed with prostate cancer in 2015-2016, in Tbilisi. According to TSRR, the incidence of prostate cancer morbidity in the age group of 60-79 is 2.3 times higher than in the age group of 50-69. According to Relative Frequency, the highest 87.7‰ and 80.9‰ incidence of prostate cancer is recorded in the age groups of 55-79 and 60-79. Detection of I and II stage prostate cancer in PSA screening groups is relatively higher (52.6‰). It was established that amendments in the screening guidelines and monitoring of 60-79 year age group instead of 50-70 years old, will increase the detection of prostate cancer cases by 27.8%. If 50% of target group is involved in the screening program the cost of the program is 289,827, and in case of 70% involvement-it is 405,757.80. Based on the results of the survey, practical recommendations have been developed.

Abbreviations: *ASR-Age Standardized Rate, TASR-Truncated Age-Standardized Rates, SRR- Standardized Rate Ratio, TSRR- Truncated Standardized Rate Ratio.*

Key words: *Prostate Cancer, PSA Screening, Tbilisi, Management.*

Problems Statement:

According to the GLOBOCAN / IARC (2012) data, about 1.1 million people worldwide were diagnosed with prostate cancer, 70% of these cases was registered in developed countries. The relatively high rate is observed in Australia and North America (97.2 per 100,000 population and age specific frequency 111.6) and in the Western and Northern parts of Europe, as prostate-specific antigen (PSA) testing and subsequent biopsy are quite common in these regions. Incidence rates are relatively high in less developed regions such as South Africa (61.8‰) and South America (60.1‰). But remains low with estimated rate 10.5‰ and 4.5‰ in Eastern and South-Central Asia. With an estimated 307,000 deaths prostate cancer is the fifth leading cause of death from cancer in men (6.6% of total men deaths). Based on the fact that PSA testing has a much greater effect on incidence than on mortality, there is relatively less variation in mortality rates worldwide than is observed for incidence. While prostate cancer deaths are relatively high in less developed countries.

Worldwide, according to data of the year 2012, the highest prostate cancer Age-Standardized Rate 111.6‰ per 100,000 was in Australia and 97.2‰ in North America. While the lowest 4.5‰ was in East and South-Central Asia. As for Europe, France has the highest morbidity rate of 227.2‰, followed by Norway with 129.7‰, Trinidad and Tobago 123.9‰, Barbados 123.1‰, Sweden 119.0‰, Australia 115.2‰, Ireland 114.2‰, Switzerland 107.2‰. The lowest rate was in Central and Eastern Europe- 30‰ in Moldova and 25‰ in Albania. (GLOBOCAN, 2012)

Pakzad, R. et al. (2015) In total there were 191,054 cases of prostate cancer in Asia, the highest incidence rate per 100,000 men was in Israel 84.3‰, 40.6‰ in Turkey, 37.2‰ in Lebanon, 33.1‰ in Singapore and 30.4% in Japan. Whereas the lowest was in Uzbekistan 2‰, 1.7‰ in Bangladesh, 2.1‰ in Turkmenistan, 1.2% in Bhutan and 1.5‰ in Nepal.

According to the IARC (2003-2007) prostate cancer age standardized morbidity rate for European towns the highest morbidity rate is observed in Italy, Modena (89.3‰) and Germany, Munich (82.5‰). Whereas the lowest is in Naples, Italy (37.5‰).

Ferlay, J. et al. (2013) Prostate cancer mortality rate in 2012 in Europe was 19.3 per 100,000 men. The highest rate is 36‰ in Lithuania, Denmark 34‰, whereas the lowest 14% is in Malta and 13‰ in Albania.

Pakzad, R. et al (2015). Mortality rate in Asia. In 2012 were identified 81,229 cases. According to the standardized data, the highest rate is recorded in Turkey 22.8‰, Lebanon 17.1‰, Armenia 13.1‰, and Philippine 11.3‰. Based on age-standardized rate these countries are included in the list of top five countries where the highest mortality rate is recorded. As for the lowest rate, it is recorded in Bhutan 0.7‰.

According to NCDC (2011-2015) data, in 2011, 169 cases of prostate cancer were reported (incidence rate 7.8‰). In 2012-187, (incidence rate 8.7‰). By the end of 2013, 631 men with diagnosis of malignant prostate cancer were registered in Georgia. With the primary diagnosis-208 (incidence rate-9.5‰) men. In 2014–224 (incidence rate 12.6‰). According to Cancer Register data, 518 new cases of cancer have been reported in 2015. The incidence rate was 29.1‰. If prostate cancer aggregated data for 2014 was 9.4%, in 2015, according to Cancer Register data, it comprised 9.9%. Despite the increased involvement, the register still could not achieved 100% coverage in 2015.
According to GLOBOCAN / IARC (2012) According to statistic database, Georgian age-standardized rate by age groups for 2012 has been adopted, where rate consistently increases and reaches the peak level in age group of 55-50 (147.2‰). Prostate cancer morbidity has not been studied since 2012 in Georgia.

GLOBOCAN/IARC (2012), 278 cases of prostate cancer were reported in all age groups in Georgia. The age-standardized rate per 100,000 men was 7.6.

Wolf, A. M. et al (2010) recommends that men must have decision making option *after* getting information about the uncertainties, *risks, and potential benefits* of prostate cancer screening. They should consider the prostate cancer screening in the following cases:

1. 50-year-old men who are at a moderate risk of prostate cancer and their life expectancy is at least 10 years;
2. 45-year-old men who are at high risk of prostate cancer development. These include Afro-Americans and men whose sons, fathers, brothers have been diagnosed with prostate cancer at an early age i.e. before 65 years;
3. 40-year-old men with relative high risk.

If the screening has not confirmed the presence of prostate cancer, follow-up observation is appointed with consideration of PSA screening.

1. Men who opted for re-examination and have PSA level less than 2.5 ng / ml. should be re-examined only after 2 years.
2. Those who have PSA levels higher than 2.5 ng / ml should be observed annually.

Since the prostate cancer is a slowly progressing disease, asymptomatic men with life expectancy not more than10 years shouldn't be screened. It is likely that they won't benefit from this.

Mottet, N. et all (2016) According to the Guidelines for the European Association of European Urology (2016), it is thought to be that the men with life expectancy less than 15 years won't benefit from early diagnostics of prostate cancer. For high risk patients follow-up observation should be arranged every two years, and for those who do not belong to the risk group this period should be prolonged up to 8 years.

Since 2011, the National Screening Center provides PSA testing financed by Tbilisi municipality. Which implies assessment of prostate cancer antigen level in 50-70 year old men annually. Initially only the prostate cancer antigen in the blood is determined If the prostate cancer antigen rate is between 4,0-10,0 ng / ml or more, the free PSA is determined in the same serum, and the ratio is calculated to detect prostate cancer risk and if necessary, the patient is referred to the specialized clinic. The services provided by the program can be used by Georgian citizens registered in Tbilisi Municipality, internally displaced persons, whose place of registration in the database of the LEPL-State Services Development Agency, is Tbilisi. The implementation rule for Disease Screening Subprogram is regulated by Tbilisi Municipality Decree Tbilisi Municipality Resolution №33-92. "Tbilisi Municipality budget sub-health implementation of the rules on approval".

The PSA test coverage rate increases every year since 2011 throughout Tbilisi. In 2016, the coverage rate was the highest compared with the previous years, 5.36% of Tbilisi target population (National Screening Center 2011-2016).

Goals and objectives of the study:

Evaluation of Prostate Cancer Screening Management Characteristics in Tbilisi**.**

Objectives set up considering the design of the study:

1. Study of Prostate Cancer Morbidity in Tbilisi in 2015-2016;
2. Comparative analysis of prostate cancer morbidity rate between Tbilisi and European countries.
3. Overview of PSA test results in the National Screening Center;
4. Survey of males aged 50-70 years in Tbilisi and evaluation of their satisfaction;

Methodology of research:

Prostate cancer morbidity in Georgia has not been studied since 2012. With reference to one of the tasks of the Bachelor's Study, prostate cancer morbidity in 2015-2016, has been studied.

Data from cancer register, regarding morbidity of prostate cancer in Tbilisi in 2015-2016, were obtained, namely: the absolute numbers of new cases according to 5-year age groups, all together 350. We have calculated prostate cancer morbidity Crude Rate , Age-Specific Rate Indicator (AI), Age-Standardized(World) Rate (ASR), Truncated Age-Standardized Rate (TASR) per 100,000 individuals, and Standardized Rate Ratio (SRR), Truncated Age-Standardized Rate Ratio (TSRR) and Relative Frequency Rate in Tbilisi,in 2015. Based on 2015 cancer register, absolute data of prostate cancer morbidity rate by stages has been studied in patients who underwent screening and those who didn't.

Within the scope of the study, economic evaluation of prostate cancer screening in Tbilisi was performed. According to the Tbilisi Municipality Decree "Approval of the Rules for Implementation of Health Care Programs provided by the Tbilisi Municipality Budget", the price of prostate cancer screening, namely *Prostate*-specific *antigen blood* test, is 9 Gel. By the population census of 2014, the overall number of Tbilisi male population in the 50-69 year age group is 100,173. Based on this data, the cost of the screening program was calculated.

Additional research within the National Screening Program has been undertaken to assess the level of satisfaction with the PSA testing and program awareness in men over the age of 50-70. The research also aimed at assessing the patient's views on the advantages and disadvantages of the program. The number of respondents was determined by the formula of the appropriate sample size calculator and the score for 80% confidence interval was 113.

Results of the research:

According to the Crude Rate in 2015-2016, in Tbilisi, prostate cancer had an incidence of 35 (35%) per 100,000 males, by Age-Standardized Rate- 27.3. by Age-Specific Rate the incidence of prostate cancer morbidity sharply increases from the age of 55-59 and reaches the peak level in 75-79 age group (299.3‰$_{000}$ -301.7‰$_{000}$) annually (See Chart 1).

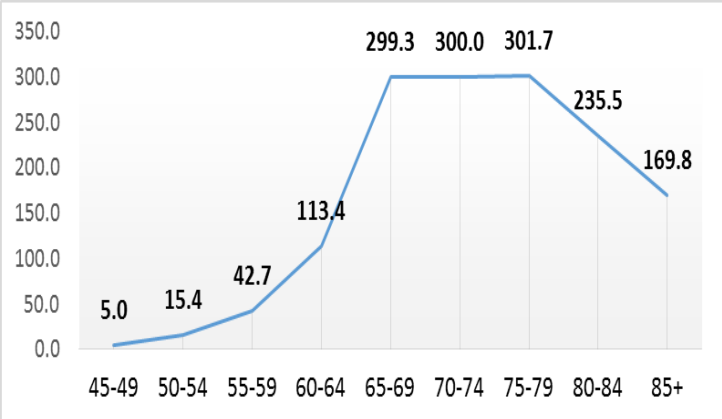

Chart 1. Age Specific Rates of Prostate Cancer Incidence 100,000 Male Populations in Tbilisi, 2015-2016
Source: Research results

According to ASR, in 2015-2016, in Tbilisi prostate cancer morbidity incidence was 27(27‰$_{000}$) per 100,000 male annually.

The prostate cancer morbidity Age-Standardized Rate in Tbilisi has been compared to the same indicators of European and Asian cities (where the cancer register is functioning and the frequency rates are reliable) (See Chart 2).

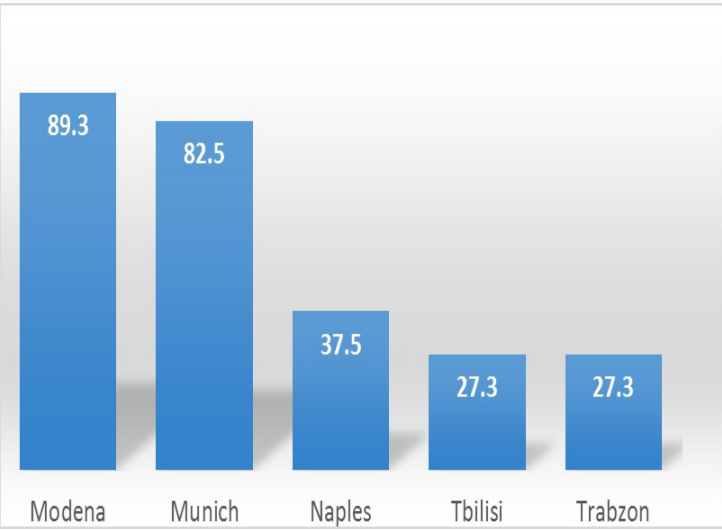

Chart 2. Age Standardized Rates (ASR) of Prostate Cancer Incidence, in Europe, Asia and in Tbilisi

Comparative analysis has shown that according to Standardized Rate Ratio , the prostate cancer morbidity level in Tbilisi is 2.4 times lower than the average level of morbidity registered in European cities (65.0). At the same time, prostate cancer morbidity level in Tbilisi is 3.3 times lower than the peak level of morbidity in Europe, which is observed in the Italian city of Modena (89.3) and 3 times lower than in Munich (82.5). In Tbilisi, the prostate cancer morbidity rate was 1.4 times low compared to the lowest level of the same location cancer morbidity in Europe, observed in Italy, Naples (37.5). The incidence frequency similar to Tbilisi was observed in Trabzon (27.3).

The Truncated Age-Standardized Rate (TASR), calculated for different age groups, has been studied. Age groups have been chosen based on age-specific indicators which revealed the increased rate of prostate cancer morbidity by age groups. Thus, the Truncated Age-Standardized Rate was calculated for three age periods. According to the current guidelines, within the scope of a screening program, a standard PSA testing is conducted in the 50-69 age group. Based on Truncated Age-Standardized Rate, in Tbilisi, in 2015-2016, the annual prostate cancer morbidity rate in the 50-69 age group was 100(100‰$_{000}$) per 100,000 male. In the following age periods, where a high Age-Specific Rate was observed, based on Truncated Age-Standardized Rate (TASR $_{55-79}$) was 173‰$_{000}$ and (TASR $_{60-79}$) -225‰$_{000}$.

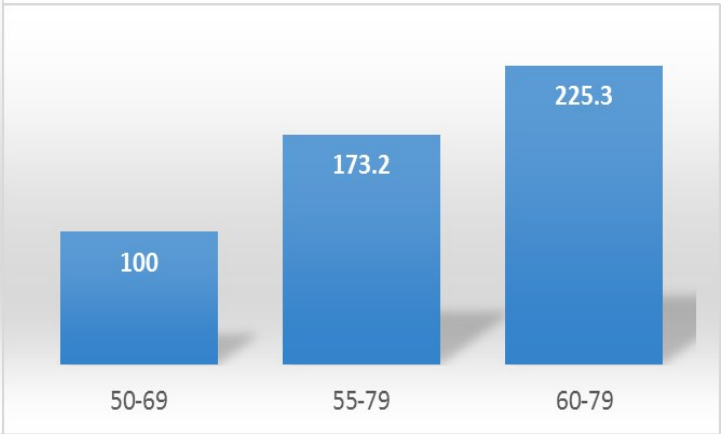

Chart 3. - Morbidity of Prostate Cancer in Tbilisi, according to Truncated Age-Standardised Rates by age groups ($TASR_{50-69}$), ($TASR_{55-79}$) and ($TASR_{60-79}$) per 100,000 men. Source: Research results

To calculate Truncated Age-Standardized Rate Ratio (TSRR) each age group was compared with $TASR_{50-69}$. Prostate cancer morbidity is 1.7 times higher in the 55-79 age group compared to the 50-69 age group. As for the 60-79 age period, it is 2.3 times higher than the prostate cancer morbidity data in the 55-69 age group (See Table 1).

Table 1. Truncated Age-Standardized Rates and Standardized Rates Ratio of the Prostate Cancer incidence per 100,000 Males in Tbilisi, in 2015-2016

Age Groups	TASR	TSRR
50-69	100	-
55-79	173.2	1.7
60-79	225.3	2.3

Source: Research results

Based on 2015 cancer register absolute data, prostate cancer morbidity rate by stages has been studied in patients who underwent screening and those who didn't (see Table 2). In 2015, according to cancer register a total of 207 prostate cancer cases were reported. From these cases information about the screening of 89 patients is not available (!).

Table 2.Prostate cancer morbidity stages according to PSA screening test in Tbilisi, in 2015

Stages	I		II		III		IV	
	Abs	%	Abs	%	Abs	%	Abs	%
Got screening	8	21.1	12	31.6	11	28.9	7	18.5
Didn't got screening	14	17.5	26	32.5	14	17.5	26	32.5

Source: Research results

According to the data of 2015, we can say that in case of screening, detection of the first and second stage prostate cancer cases increases. Since PSA based screening in 52.6% of patients has resulted in an increase of early-stage prostate cancer detection. Whereas, in males with or without screening, the percentage of prostate cancer detection at early or at late stages is equal and amounts 50%.

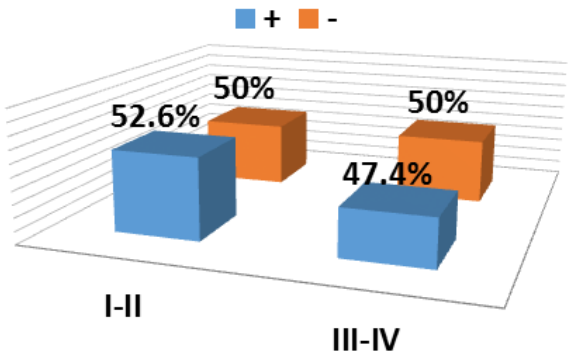

Chart 4. - Distribution of Prostate Cancer morbidity stage rates based on PSA screening in Tbilisi, in 2015
Source: Research Results

Unfortunately, in 2016 in contrast with 2015, in the Cancer Registry database, no data about the participation of patients in the screening program is registered at all. Consequently, the role of screening in the detection of prostate cancer at an early stages can not be measured in dynamics. Blank columns and inaccurate data indicate to the inaccurate management of the cancer register. Revision the quality of data entry in the databases and correction of this databases is not likely. Additionally, this is evidenced by the data on clinical stages of prostate cancer.

According to the 2016 Cancer Registry data a total of 143 cases of prostate cancer have been reported. Of these, in 30 cases clinical stage is either unknown or data is unavailable. Compared to the Cancer Registry of the year 2013, the number of blank columns is reduced, although the flaws still appear. Based on the results obtained, in 2016 compared with 2015 the early stage (I-II) prostate cancer morbidity detection has decreased from 50.8% to 38.1%, while the identification of III-IV stage cancers have increased from 49.2% to 61.9%.

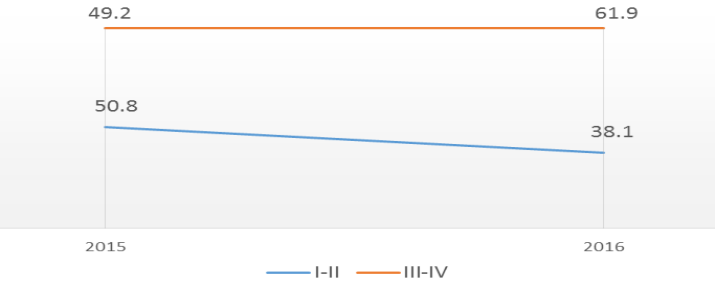

Chart 5.Rate of prostate cancer stages in dynamics in 2015 -2016

Within the scope of the study the economic evaluation for prostate cancer screening in Tbilisi was conducted. According to the Tbilisi Municipality Decree "Approval of the Rules for Implementation of Health Care Programs provided by the Tbilisi Municipality Budget", the price of prostate cancer screening, namely Prostate speciic antigen blood test, is 9 Gel. By the 2014 population census, total number of male population in Tbilisi in the 50-69 age group amounted to 100,173. Based on this data, the cost of the screening program was calculated.

Based on the European and US Prostate Cancer Screening Guidelines, since the prostate cancer is a slowly progressing disease, men with life expectancy not more than 10 years shouldn't be screened. It is likely that they won't benefit from this.

Taking into consideration the morbidity rate calculated within the scope of this recommendation and research the following age groups (50-69, 55-79 and 60-79) were selected. During calculation, 50% of target population and 70% of screening cases were discussed (See Chart 6).

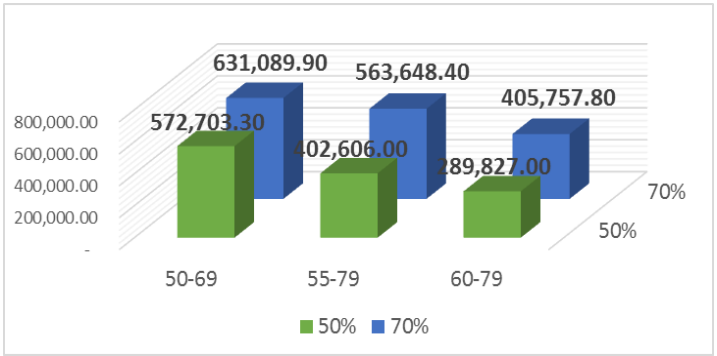

Chart 6. Cost of prostate cancer screening in 50-69, 55-79 and 60-79 age groups in case of 50% and 70% coverage of the target groups
Source: Research results

In case of 50% coverage of the 50-69 age group the screening cost will be 572,703.30 GEL, while 70% coverage amounts to 631,089.90 GEL. 50% coverage of the 55-79 age group the screening cost will be 402,606 GEL, while 70% coverage of the same group amounts to-563,648 GEL. Relatively cost-effective have proven to be the PSA testing of the 60-79 year age group, in case of 50% coverage, the cost of the test will be 289,827 GEL, while 70% coverage will cost 405,757.80 GEL.

The cost of prostate cancer screening according to the relevant age groups and coverage percentage obtained from economic analysis was compared with the 50-69 age group screening (See Table 3).

Table 3. PSA screening cost Ratios in case of 50% and 70% coverage of the target groups

Age Groups	Cost (GEL)		PSA Screening Cost Ratios	
	50%	70%	50%	70%
50-69	572,703.30	631,089.90	-	-
55-79	402,606.00	563,648.40	170,097.30	67,441.50
60-79	289,827.00	405,757.80	282,876.30	225,332.10

Source: Research results

Depending on the results, we can say that if the age period shifts and includes men aged 50-69 rather than 55-79 years old, the cost of screening program will reduce, in case of 50% coverage by 170,097.30 GEL and in the case of 70% coverage by 67,441.50 GEL . In the second discussed case, coverage of 60-79 year age group instead of 50-69 aged males, the screening program will be more cost-effective and allow us to save 282,876.30 GEL and 225,332.10 GEL, in the case of 50% and 70% coverage, respectively.

Within the scope of National Screening Program additional research has been conducted among 50-70 year old male to evaluate their satisfaction with PSA testing and the program awareness level. The research also aimed at assessing the patient's views on the virtues and shortcomings of the program. The number of respondents has been defined for a confidence interval of 80%, amounting to 113. The sample size has been selected based on the appropriate formula, used by the program on the site Openepi.com. The questionnaire included 10 questions.

13 (12%) out of 113 respondents were in 50-54 age group, 23 (20%) – in 55-59 age group, 33 (29%) in 60-64 age group, and most respondents were between 65 and 70 years old, in particular 44 (39%).

To the question when and how the men who applied to the hospital got the information about the screening program, the highest rate had information released by friends 41 (36%) and television 33 (29%), followed by the information obtained from the doctor 25 (22%), Internet 5 (4%) and Brochure 1 (1%).

To the question whether the patient would return to the survey, thus, estimating the satisfaction with the services provided, the results were the following: those interested in coming for free survey repeatedly, a year later, were 105 (93%) and the number of negative responses was 8 (7%).

To the question if the information given in the advertisement brochure was comprehensive, from the thee possible answers, on average, equal percentage 57(50%) and 56 (50%) had two - “yes” and "I do not know". To the question whether the patient had to wait long for the service, negative answer had 102 (90%) respondents, while positively responded 11(10%). Based on the fact that the National Screening Center from the 1st of March did not serve the patients with legal regional addresses, and the satisfaction survey was underway just in this period, consequently the drop in the patient flow occurred and it is likely that these changes minimized the queues, hence the number of satisfied patients increased.

111 patients (98%) of the screening program said that they would recommend others the PSA screening and 2 (2%) had negative feedback.

100 (88%) respondents think that the period between the research and receiving the research results is not long, and on the contrary 12 (12%) think that it is.

National Screening Center provides the patients with the research results only after submission of the identity document. As for the respondents' answer, to the question whether this form of receiving results is acceptable for them 103 (93%) answered positively. For 3 (3%) this form is not acceptable and the rest 7 (6%) wants to receive answers in another form. For example, on the basis of a phone call, without visiting the Center.

To the question if the respondents were satisfied with the services received in the screening center, 100% of respondents responded positively. When the patient is satisfied with the medical service he / she maintains a relationship with the clinic and recommends it to his relatives and friends.

As of the last 10th open question –“How the service can be improved, what will you change?” responders replied the following, they want the doctor Urologist’s consultation to be included in free study, and also to increase the age limit, as now the free screening program covers only males aged 50 to 70 years old. Additionally they also want to get the results of the research in electronic form, by phone call or e-mail. The desire to regulate queues in electronic format has been elicited in the National Screening Center. In their answers the respondents also expressed their desire to visit the screening office according to the place of residence, they wanted more advertisements on television and radio, and also more information before

analysis, namely, how to prepare for research, or whether it is allowed to take food before the analysis. One patient reported that he tried to find this information on the internet but in vain. There was also an opinion that a free PSA testing should be accompanied by an ultrasound study within the program. Open question revealed the appreciation and satisfaction.

Conclusions:

1. According to the Crude Rate in 2015-2016, in Tbilisi, prostate cancer had an incidence of 35 ($35\%_{000}$) per 100,000 males, by Age-Standardized Rate-$27.3\%_{000}$, by Age-Specific Rate the incidence of prostate cancer morbidity sharply increases from the age of 55-59 and reaches the peak level in 75-79 age group ($299.3\%_{000}$ - $301.7\%_{000}$) annually.
2. It has been established that according to SRR, the level of prostate cancer in Tbilisi is 2.4 times lower than the average level of incidence registered in European cities (65.0). At the same time, prostate cancer incidence in Tbilisi is 3.3 times lower compared to the peak level of incidence rate in Europe, which is observed in the Italian city of Modena (89.3) and 3 times lower than in Munich (82.5). In Tbilisi, the prostate cancer incidence rate was 1.4 times lower compared to the lowest level of cancer in Europe, namely the Italian city of Naples (37.5). A similar incidence rate as in Tbilisi was observed in Trabzon (27.3).
3. According to Truncated Age-Standardized Rate in Tbilisi, in 2015-2016, annual prostate cancer morbidity rate in the 50-69 age group was 100 ($100\%_{000}$) per 100,000 male, in the age group 55-79 -$173\%_{000}$, and $225\%_{000}$-in the 60-79 age group..
4. In accordance with the TSRR, Prostate cancer incidence is 1.7 times higher in the 55-79 age group compared to the 50-69 age group, whereas in 60-79 age group it is 2.3 times higher. According to the relative frequency rate 53.1% of prostate cancer cases are detected in the 50-69 age group, 87.7% - in 55-79 age group and 80.9%- in 60-79 age group.
5. Detection of prostate cancer cases at early, (I-II) clinical stages is higher (52.6%) in male population who underwent the PSA screening.
6. In case of 50% coverage of Tbilisi 50-69 age group male population the screening cost will be 572,703.30 GEL, while 70% coverage will amount to 631,089.90 GEL. In the event of 50% coverage of the 55-79 age group the screening cost is 402,606 GEL, while 70% coverage of the same group will amount to-563,648 GEL. In case of 50% coverage 60-79 year age group, the cost of the test will be 289,827 GEL, while 70% coverage will cost 405,757.80 GEL.
7. The most cost effective age group for PSA screening was established: 60-79 years, with incidence of more than 27.8% prostate cancer cases, and in the event of 50% and 70% screening coverage of this group saving of 282,876.30 GEL and 225,332.10 GEL, respectively, will be achieved, and compared to similar coverage volume of 50-69 age group.
8. The level of satisfaction and program awareness according to the survey results are the following:all (100%) of the 113 males interviewed at the National Screening Center are satisfied with the services received in the Screening Center; 41 (36%) and 33 (29%) received the information about the screening program from friends and television, respectively. 105 (93%) expressed willingness to come for free research repeatedly, i.e. after a year,; 102 (90%) respondents think that they did not have to wait long for the service;111 (98%) men suggested that they would recommend others participation in PSA screening, 100 (88%) believes that the period before receiving the answers from the research is not long; for 103 (93%) the current form of receiving the study results is acceptable ; In order to improve the service, the respondents consider the following measures: increase screening age limit, introduce doctor urologist's consultation and ultrasound in the guideline, receive research results in electronic form(by phone call or e-mail), more access to information about the research before screening.

Recommendations:

1. In order to increase the cost-efficiency of the prostate cancer screening program it is recommended to make changes in the program guidelines, namely: to conduct PSA screening in the 60-79 age group instead of 50-70 (which allows us to detect more than 27.8% of prostate cancer cases); Subsequent PSA testing in asymptomatic men once in two years (which will reduce the screening expenses twice).

2. In order to increase the assessment efficacy and screening program monitoring quality, it is recommended, the Population Register for Cancer improve the quality of electronic database, register clinical stages of the cancer and cases of patients' participation in the screening program.
3. In order to increase the screening program efficacy, it is recommended, the National Screening Center increase the PSA screening coverage of target group, by providing the information about the screening with the help of television.
4. In order to improve the quality of screening services, it is recommended, The National Screening Center introduce a queue management system for patients, deliver the results of the conducted research in electronic form (at patients option), provide programmed Call-Recall System of patients.

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Health Economic Aspects of Diabetes Foot Complications: Results from Patients survey

Simon Gabritchidze

The University of Georgia, School of Health Sciences and Public Health[1], Welfare Foundation[2]
[1]MD, MS, MA, PhD (c) , [2]Executive Director

Summary

Diabetes foot is common complication of late diabetes. It causes not only severe morbidity and infirmity but also results significant health economic consequences. Evidence proves that majority of diabetic foot cases are complicated and mainly diagnosed in surgical departments of the hospitals in Georgia, which represents less cost-effective approach. The proposed research assessed health economic consequences of diabetes foot patients in the capital city - Tbilisi and 5 regions of Georgia. For this purpose, quantitative survey of diabetes foot patients was conducted using face-to-face personal interview method. The patients were interviewed by preliminary trained nurse-podiatrists after visiting diabetes foot rooms (exit interviews). In total, 126 patients with diabetes foot complications were interviewed. The survey indicated that the households of patients with diabetes foot problems have considerably low income compared to their medical expenditure. Diabetes foot patients usually experience out-of-pocket payments during outpatient visits as Universal Healthcare Program (UHP) mainly covers emergency and inpatient services (e.g. amputations). Additionally, UHP does not cover patients' expenses on pharmaceuticals. As a result 64% of surveyed patients with diabetic foot problems cannot afford to buy necessary medicines. The survey indicated high rates of risky behavior and low awareness of patients on issues related to disease prevention and healthy life-style. Due to financial problems and absence of proper services, only 18% of diabetes patients with foot complications wear special shoes. The survey results clearly indicated that appropriate changes in the Governmental policy and programs are required. The major issue is to switch focus of state healthcare programs from expensive and high resource consuming in-patient care to much more cheap and effective preventive outpatient services.

Abbreviations: *UHP-Universal Healthcare Program*

Key words: *diabetes; diabetes foot; health economics; patient survey, prevention.*

Introduction:

Diabetic foot is one of the most widespread complications of late diabetes. According to international estimation, about quarter of people with diabetes develop diabetic foot ulcer at some point of their life (Boulton A, 2005). Diabetes foot ulcers often cause lower extremity amputations. According to International Working Group on Diabetes Foot, 70% of all low limb amputations are related to diabetes (IDF, 2017). Particular alarming is situation in low and middle income countries. If there is positive trends of reduction in rates of amputations among adults with diabetes during the past 10–15 years in some industrialized nations (e.g. the United Kingdom, Sweden, Denmark, Spain, the United States of America and Australia), no such encouraging data is available from low or middle-income countries (WHO, 2016).

In addition to causing suffering and morbidity, foot lesions in diabetic patients have substantial economic consequences as diabetes is a chronic disease that requires a life-long commitment of resources to prevent and treat complications. For example, 33% percent of the $116 billion in direct costs of treatment of diabetes and its complications in the U.S. in 2007 were associated with the treatment of foot ulcers (Carls G. et al, 2011). In England, there are estimated to be 6,000 diabetes related amputations per year, with the estimated cost of diabetes related foot disease in particular ulceration and amputation calculated to be between £639 and £662 million per annum (Gooday C. et al, 2013). The disease affects an increasingly large number of people around the world, putting them at risk for disability and diminished quality of life.

There is no official data on diabetic foot prevalence/ incidence and end-points available in Georgia, however, it is suspected, that these numbers could be even higher compared to international average. Most of the diabetic foot cases are diagnosed later stages when the patients are admitted to surgical departments. This demonstrates that existing educational and preventive activates among people with diabetes are very poor in Georgia.

In general, health economic research is rarely conducted or published in Georgia. Consequently, no study exists which describes economic consequences of diabetes foot complications in Georgian patients. Without this type of research individuals, health providers, insurance companies, public entities and at the end whole society waste valuable resources as health economics concerns issues of effective allocation of scarce resources in order to achieve improved health outcome. A modeling estimation shows that in USA a 50% improvement in diabetes management and control could reduce annual medical costs for patients with diabetes by $196 billion over a twenty-year period (Fitch, 2010).

In England, Department of Health Audit Office estimated that reducing late referrals by 50% could save £34 million a year through reducing amputation rates. In order to achieve these savings, patients should have ready access to the services of podiatrists who have the necessary knowledge and skills to deal with these complex patients (C. Gooday et al. 2013).

Methodology:

The aim of the study was to assess health economic consequences of diabetes foot patients in the capital city - Tbilisi and 5 regions of Georgia (Adjara, Imereti, Samegrelo, Kvemo and Shida Kartli). These patients visit 11 diabetes foot rooms that have been opened under the framework of a project "Diabetes Foot Care Improvement" The project is supported by World Diabetes Foundation (WDF) and implemented by Welfare Foundation (WF).

The following questions were studied during the survey:

- ◊ Patients financial and geographic accessibility to diabetes foot care services;
- ◊ Patients families income and expenditure
- ◊ Patients expenditure on health care services
- ◊ Patients access and expenditure on pharmaceuticals
- ◊ Patients access and expenditure on special shoes and supportive materials
- ◊ Patients awareness and behaviour related to disease prevention and health life-style

To find the answers on these questions quantitative survey was conducted using face-to-face personal interview methodology. The patients were interviewed by specially trained nurse-podiatrists after visiting diabetes foot rooms (exit interviews). Semi-structured questionnaires were employed for the interviews.

Ethical issues:

All patients were informed about potential risks and benefits of participation in the survey before the interviews. All of them received informed consent forms which described objectives of the study, confidentiality and privacy issues, respondents' right to leave the interviews any time they wish. Only after receiving informed consent the patients were interviewed.

Results:

In total, 126 patients with diabetes foot complications were interviewed. 3 patients refused to be interviewed and 1 of them only partially answered the questions. The table 1 shows distribution of interviewed patients according to the regions.

Respondents age ranged from 39 to 79, (mean - 61, median – 60, mode – 66). Among them 54% were male and 46% female. Slight Majority of respondents (56%) had secondary or professional education, remaining 44% owned university degrees (diploma). Only 9% of interviewed patients were single (5%) or widow (4%), remaining 91% were married. On the question whether they experienced ulcer/wound in their foot – 26% of respondents answered positively and 9% of them undergone amputation (minor, on toe).

Table 1. Distribution of respondents

Region	Number of interviewed patients	%
Adjara	21	17
Imereti	32	25
Samegrelo	10	8
Kvemo Kartli	18	14
Shida Kartli	19	15
Tbilisi	26	21
Total	126	100

The survey indicated that about half of respondents (47%) have lived with diabetes more than 5 years. The others were diagnosed during 2012-2016 years:

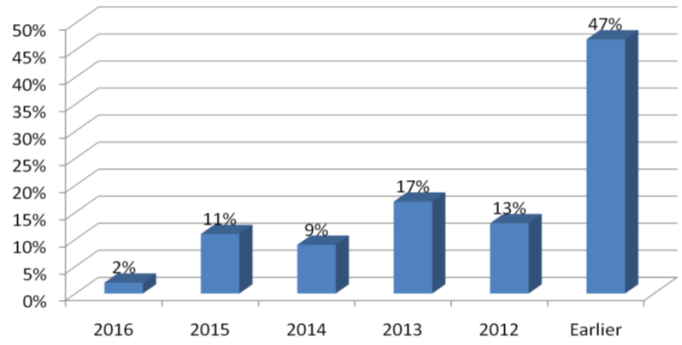

Figure 1. When diabetes was diagnosed among respondents (%)

Similarly, 45% of respondents have diabetes foot problems more than 5 years. At the same time, it is interesting to note that considerably number of new diabetes foot cases was diagnosed in 2016 (28%). This fact may be explained by establishment of diabetes foot rooms in the WDF project targeted regions:

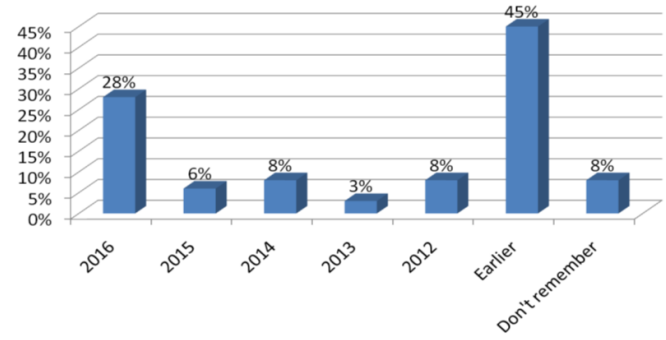

Figure 2. When diabetes foot was diagnosed among respondents (%)

The survey indicated that the households of patients with diabetes foot problems have considerably low income. For example, the household income for majority of respondents (66%) does not exceed 500 Georgian Lari (GEL) and only 14% of respondents have income more than 1000 GEL:

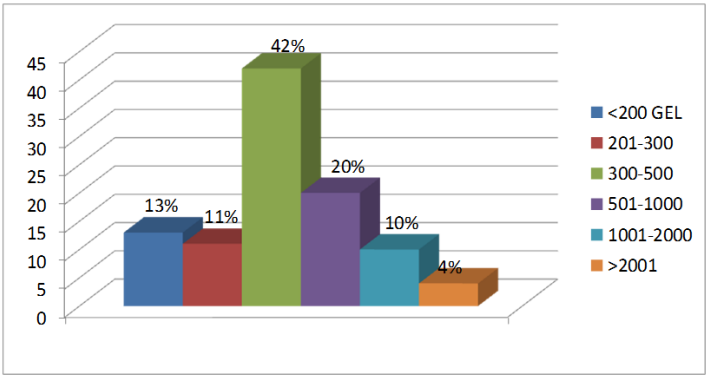

Figure 3. Monthly household income in GEL (%)

The patients with diabetes foot complications have high healthcare expenditures compared to their household income. According to the survey, more than half (56%) of the respondents reported monthly healthcare expenditure in the range of 100-300 GEL:

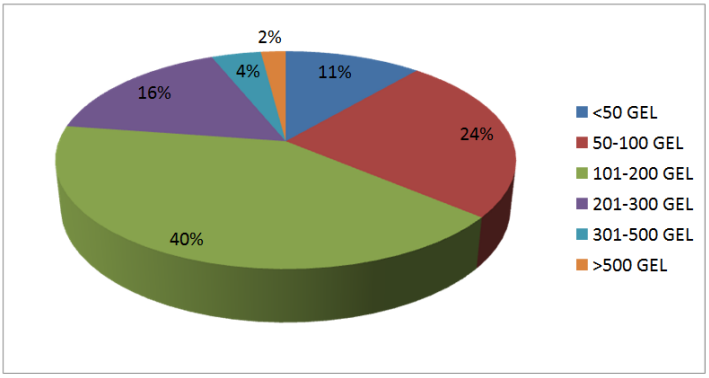

Figure 4. Monthly healthcare expenditure in GEL (%)

Diabetes foot patients usually experience out-of-pocket payments during outpatient visits. In 2013, The Government of Georgia launched ambitious Universal Healthcare Program in order to improve financial accessibility of people without private insurance to healthcare services. However this program mainly covers emergency and inpatients services. Thus, ¾ of respondents reported out-of-pocket payments during the last outpatient visits:

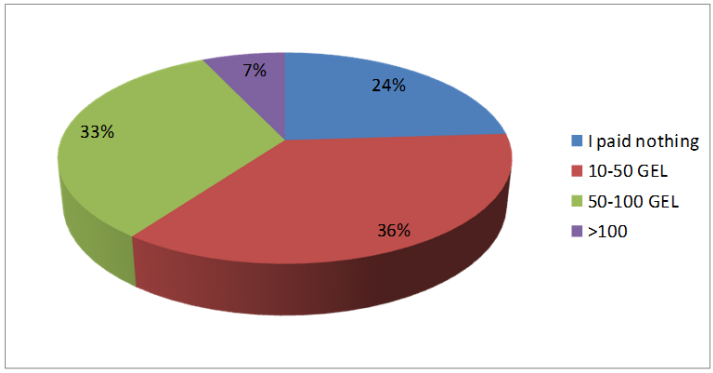

Figure 5. patients expenditure during the last outpatient visits in GEL (%)

More than half of respondents (52%) reported that they avoid visit to their doctor during illness, which is mainly explained by health care cost. They simply cannot afford payment of service fee in private medical facilities (27%). Problems related to geographical accessibility and time are less important in this case:

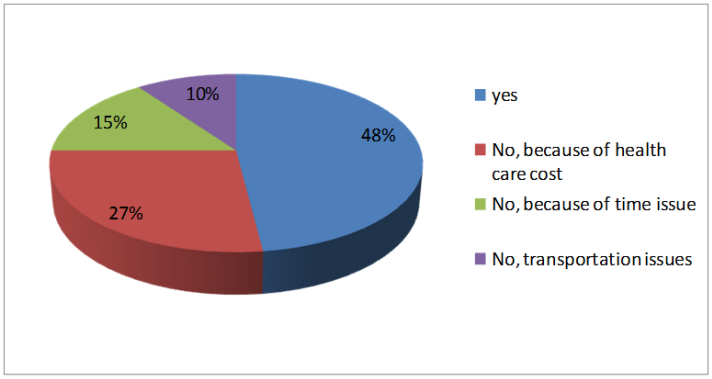

Figure 6. patients visits to doctor during illness (%)

Almost all respondents are beneficiaries of State Universal Healthcare Program (UHP) and seldom have private insurance, which limits their access to outpatient healthcare services and pharmaceuticals. Currently, UHP does not cover expenses on pharmaceuticals. As a result 64% of surveyed patients with diabetic foot problems cannot afford to buy necessary medicines.

As it was mentioned above 9% of respondents reported amputation on their toe. All these cases were funded by the state program. This fact once more proves that the Government mainly covers inpatient medical expenses.

Majority of respondents reported financial issues as a main barrier in terms of accessibility to healthcare services. Long distance to medical facility, low skills of medical personnel or other reasons were mentioned in a few cases:

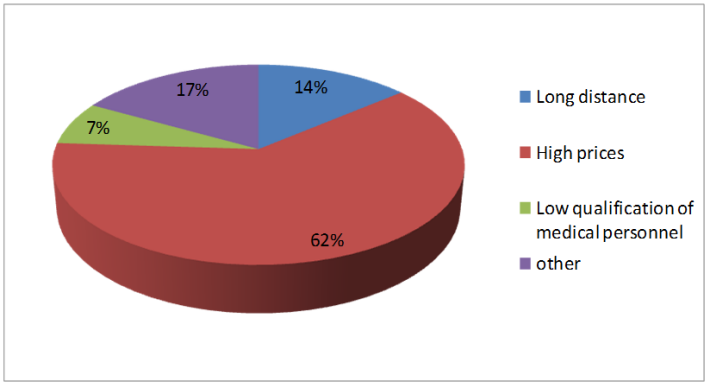

Figure 7. Main barriers to access to healthcare services (%)

The survey indicated high rates of risky behavior and low awareness of patients on issues related to disease prevention and healthy life-style. In spite of high adverse effect, 27% of patients are smokers and more than half (58%) do not have regular, any type of physical activity. 18% of respondents attended educational session on diabetes foot care/prevention. It is interesting to note that 89% of them did it during last 6 months. This fact may be explained by the "Diabetes Foot Care Improvement" project. In the framework of this project, most active community members (mainly nurses) were selected and trained as peer-educators who later carried out educational sessions for patients and their family members. Additionally, 36% of respondents read printed information materials on diabetes foot care and prevention (mainly distributed through the project activities). The survey indicated high rate of interest among diabetes foot patients to learn more about diabetes foot care and prevention - 95% of interviewed patient expressed interest in these issues.

The survey indicated lack of supportive services and materials that help patients avoid diabetes foot complications. Financial accessibility issue is leading factor in this case as well. For example, only 18% of diabetes patients with foot complications wear special shoes:

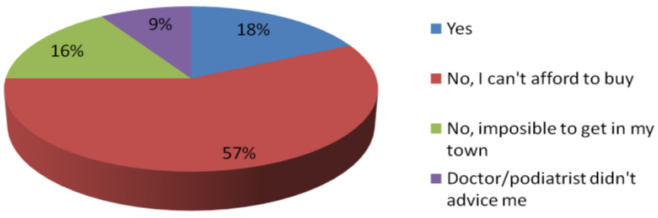

Figure 8. Do patients wear special shoes (%)?

Discussion and Conclusions:

Diabetic foot infections are one of the most costly foot complications because of their long healing time and often poor outcome. The survey indicated high healthcare expenditures of diabetes foot patients compared to their income. Particularly, it relates to fees for outpatient services which are mainly covered by the patients themselves. As a result, the patients often delay/postpone visit to their doctors which cause further foot complications. Almost all interviewed patients are covered by state Universal Healthcare Program (UHP), which mainly covers the cost of in-patient services (e.g. amputation). Such design of the main state healthcare program is less cost-effective as causes high rates of expensive surgical procedures and in-patient treatment. According to international experiences management strategies that speed up healing and reduce the number of amputations are much more cost effective. At the same time, the authors concluded that rate of amputations may be related to patients' reimbursement options. For example, higher rate of lower-extremity amputation is more evident when the cost of an amputation procedure is reimbursed but the costs of outpatient care are not (Van Houtum & Lavery, 1996).

Over the past several years there have been various attempts to adopt complex, system-wide health reforms aimed at improving health and social wellbeing of Georgian citizens. Means-based targeted approach of the former government has been radically changed by "Georgian Dream" government that decided to universally cover Georgian population with social and health insurance schemes. Public health budget increased almost three times during the last 4 years. Though, these resources are not directed for disease prevention and Georgia's health sector still demonstrates (as it always have been) system imbalances between curative and preventive services. Regular outpatient examinations cost around 300 United State Dollar (USD) at the National Centre for Diabetes Research (leading health care center for diabetes treatment). The similar situation is in other health care facilities (currently absolute majority of Georgian hospitals/clinics are private, for profit oriented) specializing in diabetes treatment and care. Self-blood glucose monitoring equipment costs 50 USD and 50 test strips cost 30 USD. These amounts are too expensive for the majority of patients, if high rates of out-of-pocket payments are taken into consideration. Poor access to medications, lack of regular routine examinations and preventive measures conditions often cause complications such as diabetic foot problems.

In the existed situation assistance from the international donors has great importance. Under the framework of "Diabetes Foot Care Improvement" project nurse-podiatrists were trained and 11 diabetes foot rooms established in 6 regions of Georgia. These developments noticeably contributed to early detection of diabetes foot problems. However, it is obvious that only detection without appropriate and timely treatment has little effect. Additionally, the role of nurse-podiatrist is not well understood by the majority of managers of medical facilities. Another research conducted by Welfare Foundation revealed that the podiatrists mainly deal with "minor foot issues" as according to written internal regulations (or informal verbal directives) the complicated cases are referred to surgical department for further examinations and operations.
Limited access to pharmaceuticals is another issue that prevents timely prevention of diabetes foot complications. As research indicated majority of diabetes foot patients are UHC program beneficiaries which does not cover outpatient drug expenses. As a result 64% of patients can't afford to buy prescribed medicines. In general, diabetes foot patients have significantly high medical expenditure in relation to their income which is also considerably related to access and cost of pharmaceuticals.

Based on more emergency and inpatient focus of healthcare programs in Georgia there is no surprise that patients exhibit risky behavior and have low awareness on diabetes foot prevention or care and healthy life style. However, high interest of the patients to learn more about these issues is optimistic signal that should be adequately considered with relevant actions by the policymakers. Additionally, the State role in supplying diabetes foot patients with supportive materials (e.g. shoes) is significant. As majority of the patients cannot afford to purchase such shoes, private companies have little interest to develop suitable services especially, in the regions.

Coming from these findings, more work is necessary from the professional associations, individual experts and civil society organizations to achieve appropriate changes in the Governmental policies and programs. The major issue is to switch focus of state healthcare programs from expensive and high resource consuming in-patient care to much more cheap and effective preventive outpatient services.

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Cooperation of Liver Cells in Health and Disease

Davit Tophuria[1], Maia Matoshvili[2], Levan Benashvili[3], Inga Kakhniashvili [4]

Tbilisi State Medical University
Departments: Human Normal Anatomy[1], Dermatology and Venereology[2], Topographic Anatomy and Operative Surgery[3], Clinical Skills[4]

[1]Supervisor MD, PhD, Associate Professor; [2]MD, PhD, Assistant Professor; [3]MD, PhD Assistant Professor;

[4]PhD student

Summary

The enormous number of different liver functions are carried out by parenchymal and four main types of nonparenchymal cells, either alone or in cooperation. Although the liver tissue is uniform on the level of histology, it is heterogenous on the level of morphometry and histochemistry. This heterogeneity is related to the blood supply; cells located in the upstream or periportal zone differ from those in the downstream or perivenous zone in their equipment with key enzymes, translocators, receptors, and subcellular structures and therefore have different functional capacities.

Abbreviations: SEC-sinusoidal endothelial cells, KC-Kupffer cells, IHL-intrahepatic lymphocytes, ECM-extracellular matrix, APC-antigen-presenting cells, LPS-lipopolysaccharide, NK- natural killer cells.
Key Words: *Liver Cells, Health, Disease.*

The liver lobule is formed by parenchymal cells, i.e., hepatocytes and nonparenchymal cells. In contrast to hepatocytes that occupy almost 80% of the total liver volume and perform the majority of numerous liver functions, nonparenchymal liver cells, which contribute only 6.5% to the liver volume, but 40% to the total number of liver cells, are localized in the sinusoidal compartment of the tissue. The walls of hepatic sinusoid are lined by three different cell types: sinusoidal endothelial cells (SEC), Kupffer cells (KC), and hepatic stellate cells (HSC, formerly known as fat-storing cells, Ito cells, lipocytes, perisinusoidal cells, or vitamin A-rich cells). Additionally, intrahepatic lymphocytes (IHL), including pit cells, i.e., liver-specific natural killer cells, are often present in the sinusoidal lumen. It has been increasingly recognized that both under normal and pathological conditions, many hepatocyte functions are regulated by substances released from neighboring nonparenchymal cells. Liver sinusoidal endothelial cells constitute the lining or wall of the hepatic sinusoid. They perform important filtration function due to the presence of small fenestrations that allow free diffusion of many substances, but not of particles of the size of chylomicrons, between the blood and the hepatocyte surface. SEC show huge endocytic capacity for many ligands including glycoproteins, components of the extracellular matrix (ECM; such as hyaluronate, collagen fragments, fibronectin, or chondroitin sulphate proteoglycan), immune complexes, transferrin and ceruloplasmin. SEC may function as antigen-presenting cells (APC) in the context of both MHC-I and MHC-II restriction with the resulting development of antigen-specific T-cell tolerance. They are also active in the secretion of cytokines, eicosanoids (i.e., prostanoids and leukotrienes), endothelin-1, nitric oxide, and some ECM components.Kupffer cells are intrasinusoidally located tissue macrophages with a pronounced endocytic and phagocytic capacity. They are in constant contact with gut-derived particulate materials and soluble bacterial products so that a subthreshold level of their activation in the normal liver may be anticipated. Hepatic macrophages secrete potent mediators of the inflammatory response (reactive oxygen species, eicosanoids, nitric oxide, carbon monoxide, TNF-alpha, and other cytokines), and thus control the early phase of liver inflammation, playing an important part in innate immune defense. High exposure of Kupffer cells to bacterial products, especially endotoxin (lipopolysaccharide, LPS), can lead to the intensive production of inflammatory mediators, and ultimately to liver injury.

Besides typical macrophage activities, Kupffer cells play an important role in the clearance of senescent and damaged erythrocytes. Liver macrophages modulate immune responses via antigen presentation, suppression of T-cell activation by antigen-presenting sinusoidal endothelial cells via paracrine actions of IL-10, prostanoids, and TNF-alpha, and participation in the development of oral tolerance to bacterial superantigens. Moreover, during liver injury and inflammation, Kupffer cells secrete enzymes and cytokines that may damage hepatocytes, and are active in the remodeling of extracellular matrix. Hepatic stellate cells are present in the perisinusoidal space. They are characterized by abundance of intracytoplasmic fat droplets and the presence of well-branched cytoplasmic processes, which embrace endothelial cells and provide focally a double lining for sinusoid. In the normal liver HSC store vitamin A, control turnover of extracellular matrix, and regulate the contractility of sinusoids. Acute damage to hepatocytes activates transformation of quiescent stellate cells into myofibroblast-like cells that play a key role in the development of inflammatory fibrotic response. Pit cells represent a liver-associated population of large granular lymphocytes, i.e., natural killer (NK) cells. They spontaneously kill a variety of tumor cells in an MHC-unrestricted way, and this antitumor activity may be enhanced by the secretion of interferon-gamma. Besides pit cells, the adult liver contains other subpopulations of lymphocytes such as gamma delta T cells, and both "conventional" and "unconventional" alpha beta T cells, the latter containing liver-specific NK T cells. The development of methods for the isolation and culture of main liver cell types allowed to demonstrate that both nonparenchymal and parenchymal cells secrete tens of mediators that exert multiple paracrine and autocrine actions. Co-culture experiments and analyses of the effects of conditioned media on cultures of another liver cell type have enabled the identification of many substances released from non-parenchymal liver cells that evidently regulate some important functions of neighboring hepatocytes and non-hepatocytes. To the key mediators involved in the intercellular communication in the liver belong prostanoids, nitric oxide, endothelin-1, TNF-alpha, interleukins, and chemokines, many growth factors (TGF-beta, PDGF, IGF-I, HGF), and reactive oxygen species (ROS). Paradoxically, the cooperation of liver cells is better understood under some pathological conditions (i.e., in experimental models of liver injury) than in normal liver due to the possibility of comparing cellular phenotype under in vivo and in vitro conditions with the functions of the injured organ. The regulation of vitamin A metabolism provides an example of the physiological role for cellular cross-talk in the normal liver. The majority (up to 80%) of the total body vitamin A is stored in the liver as long-chain fatty acid esters of retinal, serving as the main source of retinoids that are utilized by all tissues throughout the body. Hepatocytes are directly involved in the uptake from blood of chylomicron remnants, and the synthesis of retinol-binding protein that transfers retinol to other tissues. However, more than 80% of the liver retinoids are stored in lipid droplets of hepatic stellate cells. HSC are capable of both uptake and release of retinol depending on the body's retinol status. The activity of some major enzymes of vitamin A metabolism have been found to be many times higher per protein basis in stellate cells than in hepatocytes. Despite progress in the understanding of the roles played by these two cell types in hepatic retinoid metabolism, the way in which retinoids move between the parenchymal cells, stellate cells, and blood plasma has not been fully elucidated. Sinusoidal blood flow is, to a great extent, regulated by hepatic stellate cells that can contract due to the presence of smooth muscle alpha-actin. The main vasoactive substances that affect constriction or relaxation of HSC derive both from distant sources and from neighboring hepatocytes (carbon monoxide, leukotrienes), endothelial cells (endothelin, nitric oxide, prostaglandins), Kupffer cells (prostaglandins, NO), and stellate cells themselves (endothelin, NO). The cellular cross-talk reflected by the fine-tuned modulation of sinusoidal contraction becomes disturbed under pathological conditions, such as endotoxemia or liver fibrosis, through the excess synthesis of vasoregulatory compounds and the involvement of additional mediators acting in a paracrine way. The liver is an important source of some growth factors and growth factor-binding proteins. Although hepatocytes synthesize the bulk of insulin-like growth factor I (IGF-I), also other types of nonparenchymal liver cells may produce this peptide. Cell-specific expression of distinct IGF-binding proteins observed in the rat and human liver provides the potential for specific regulation of hepatic IGF-I synthesis not only by growth hormone, insulin, and IGF-I, but also by cytokines released from activated Kupffer (IL-1, TNF-alpha, TGF-beta) or stellate cells (TGF-alpha, TGF-beta). Hepatic stellate cells may affect turnover of hepatocytes through the synthesis of potent positive as well as negative signals such as, respectively, hepatocyte-growth-factor or TGF-beta. Although hepatocytes seem not to produce TGF-beta, a pleiotropic cytokine synthesized and secreted in the latent form by Kupffer and stellate cells, they may contribute to its actions in the liver by the intracellular activation of latent TGF-beta, and secretion of the biologically active isoform. Many mediators that reach the liver during inflammatory processes, such as endotoxins, immune-complexes, anaphylatoxins, and PAF, increase glucose output in the perfused liver, but fail to do so in isolated hepatocytes, acting indirectly via prostaglandins released from Kupffer cells. In the liver, prostaglandins synthesized from arachidonic acid mainly in Kupffer cells in a response to various inflammatory stimuli, modulate hepatic glucose metabolism by increasing glycogenolysis in adjacent hepatocytes.

The release of glucose from glycogen supports the increased demand for energetic fuel by the inflammatory cells such as leukocytes, and additionally enables enhanced glucose turnover in sinusoidal endothelial cells and Kupffer cells which is necessary for effective defense of these cells against invading microorganisms and oxidative stress in the liver. Leukotrienes, another oxidation product of arachidonic acid, have vasoconstrictive, cholestatic, and metabolic effects in the liver. A transcellular synthesis of cysteinylleukotrienes (LTC4, LTD4, and LTE4) functions in the liver: LTA4, an important intermediate, is synthesized in Kupffer cells, taken up by hepatocytes, converted into the potent LTC4, and then released into extracellular space, acting in a paracrine way on Kupffer and sinusoidal endothelial cells. Thus, hepatocytes are target cells for the action of eicosanoids and the site of their transformation and degradation, but can not directly oxidatearachidonic acid to eicosanoids.

Conclusion

The liver is a heterogeneously complex organ and understanding the 3-dimensional structure, physiology, and cellular components is integral to the interpretation of genomic and proteomic data as well as disease pathogenesis and prevention. Future elucidation of the heterogeneity and complexity of the liver, for example using emerging genomics and imaging technology, will help in the fight against liver disease and cancer and find new targets for therapy.

Multi-Causal Phenomenon of Preterm Delivery (Epidemiological Review)

Natia Kvaratskhelia[1], Vasil Tkeshelashvili[2]

The University of Georgia, School of Health Sciences and Public Health
[1]PHD (c), [2]Supervisor, MD, JD, PhD, ScD, Professor

Summary

Major reasons for infant morbidity around the world are preterm delivery, infections, and complications. Premature children, who succeed to live, often have health-related issues. Medicine today uses modern achievements in diagnostics to reveal potential preterm delivery. Possible syndromes of preterm delivery are of heterogeneous nature, and include biological, social, and psychological factors. It's a sad fact, but even "healthy" mothers give birth to premature babies. Various surveys described in this article are clear proof of that. Together with clinical issues of preterm delivery, medical-technical issues should also be considered alongside with ethical norms and legal issues of obligation of treatment or refusal to treatment. Psychological side is also of importance, since birth of a premature baby usually poses stress to the family, where adults require moral support to resolve it in a dignified manner. To reduce the burden of health complications resulting from preterm delivery, it is necessary to find ways for completing the full term of pregnancy, at least until week 39. For this, the quality of care for pregnant women and infants should increase, new preventive and treatment measures are to be found, and new global initiatives need to appear.

Abbreviations: *WHO – World Health Organization; OR – Odds Ratio; RR – Relative Risk 95%; CI – 95% Confidence Interval; BMI – Body Mass Index; JOG – British Journal of Gynecology; NCDC – National Centre of Disease Control;*

Key words: *preterm delivery, risk factors, epidemiology*

Introduction

There is no doubt that various pathologies of intranatal and postnatal period may reflect on etymology and pathogens of many diseases during adulthood. Preterm delivery, along with related medical complications, is one of such pathological conditions. Premature infants fall under the high-risk group for developing cerebral palsy and mental development issues. All premature children have high risk for developing minimal brain dysfunction, including speech and vision impairment, lack of concentration, and difficulties in learning. There is also a high risk for neurological-psychical development heavy delays. Some authors also describe heavy delay of cognitive as well as motoric skills on late stage of ontogenesis (ITV. 2011).

- ◊ There are 15 million deaths of premature infants in the world
- ◊ 1.1 million premature newborns cannot be saved
- ◊ Prevalence of preterm delivery in different countries is 5-18%
- ◊ 80% of premature babies are born at the week of 32-37, and majority survive thanks to the modern infant care standards.
- ◊ Prevention of over 75% of premature births is possible without intensive medical intervention.
- ◊ Brazil, USA, India, Nigeria have some of the highest rates of preterm delivery, indicating global scope of the problem.
- ◊ Poor countries have 12% of preterm delivery, as opposed to 9% in high income countries. Poor families usually have higher risks (World Health Organization 2012).

Data from 190 countries, as assessed by WHO, indicates preterm delivery as the cause of 36% of infant deaths in 2012 (Lawn, JE. 2014).

Even though doctors have high success with child health, small birth weight, prevention of preterm delivery and its forecast is still a challenge. In spite of decades of work, scientists could not come up with effective means for preventing preterm delivery. Introduction of cost-effective treatment and prevention measures is a challenge for the modern society (Helmer, H. 2007). WHO guidelines indicate need for creation of the effective services by healthcare organizations, and giving medical personnel relevant information on effective treatment of pregnant women and premature babies (WHO report 2015).

In a long run, premature birth is associated with the quality of life, and need for intensive use of medical services, which, in turn, result into high costs of the healthcare services used by the individual. Some countries have counted the cost, which, for example, totals up to €50,800 for Germany, whereas standard medical service for the timely born infants for a tear is only €5,800 during the first year of life. (Kirschner, W. 2007; March of Dimes, 2009). Each year, Germany spends about €3.3 billion on medical services of the premature babies. Increase of costs is usually associated with intensive use of stationary service. Compared to timely born babies, infants with less than 37 weeks of gestation period use medical services three times more intensively, while the intensiveness of use of medical services by those born under 32 weeks is 7 times higher (Kirschner, W. & Mylonas, 2014).

In 2005, USA spent about $2.2 billion out of healthcare budget on preterm delivery. Hospitalization of 24+0 _24+6 premature infants cost $203,000 per infant (Winckel, UC. 2010).

However, apart from hospitalization, there are numerous other factors that are associated with preterm delivery:

- ◊ Costs of delivery
- ◊ Early integration cost
- ◊ Development-related education cost
- ◊ Disability-related rehabilitation cost
- ◊ Lifetime care cost
- ◊ Financial support from the family
- ◊ Lack of productivity resulting from development issues.

Costs associated with prematurity are directly proportional to the delivery term, and is especially large for extremely young premature infants.

Longitude study conducted by English and Irish scientists show that length of use of stationery services by premature children during first 10 years of life is twice longer than for those born at the right term (Petrou S. BJOG, 112 Suppl 1:10-5).

These figures show the importance of proper prevention and management of preterm delivery for a country with healthcare system like in Georgia (under the conditions of low income population and expensive medical care).

- ◊ According to WHO data, in 2013, about 1,1 million cases of child deaths out of 6,3 million resulted from complications caused by preterm delivery.

- ◊ In 2014 over 200 countries participated in activities and over 60 countries planned special activities to raise awareness of the population on health of premature children, infants and mothers.

- ◊ In 2015 complications resulting from preterm delivery have not lost its importance, and remained cause for majority of child deaths.

Similar to other counties in transition, Georgia has its healthcare-related problems, including those in reproductive medicine. There is a need for finding effective solutions to these problems. Preterm delivery is one of them. According to official statistics, Georgia has maintained its 9.7% indicator for preterm delivery during 2014-2015 (NCDC). However, the same source indicates 6.7% as the rate for premature infants (Table 1).

National Center for Disease Control and Public Healthcare
Weight of live- and still-born babies at the time of birth (maternity house data)
Georgia, 2014

	Total					
Live births	30235	161	401	3085	51666	4922
% of total live births	100.0	0.3	0.7	5.1	85.8	8.2
Stillborn	637	264	95	129	132	17
% of total stillborn	100.0	41.4	14.9	20.3	20.7	2.7

Source: National Center for Disease Control and Public Health

Regardless of decreasing tendency of neonatal and perinatal mortality in Georgia, introducing and applying experience of countries that have accumulated significant experience in newborn treatment and nutrition, and adapting to Georgian context, is of huge importance. Medical issues of premature newborns (incubation, nutrition, morbidity, mortality) require in depth medical study, their medical rehabilitation, adaptation, and integration into the environment.

Georgia still has no statistics available on the improvements of care for premature infant survival, or opportunities for their full mental and physical development. Lack of statistics is the reason why current prevention, treatment and management guidelines were created based on non-Georgian data.

Definition

Medical literature defines preterm delivery as childbirth that takes place within the interval of less than 260 days from the last menstrual period (37 weeks). WHO considers infants under 2,500 grams of weight as premature. Weight indicators are based on epidemiological studies, according to which babies that weigh less than 2,500 grams have 20 times higher rates of mortality. Weight criteria was developed during 1948 Assembly meeting. Later, prematurity was defined as that of less than 38 weeks of pregnancy (Helmer, H. 2007).

Small body weight of infants may serve as the reason for growth and developmental delays. However, another studies found that often there is varying correlation between infant body mass and pregnancy term. It was decided to create a classification that would be focused on the growth and development of the infant, and following categories were adopted: infants that are "small for pregnancy term," "corresponding to pregnancy term," and "big for pregnancy term."

International statistical classifier, ICD-10 covers length of pregnancy as well as body mass of the newborn:

P07.0 newborns with very little body mass (<999 grams)
P07.1 newborns with little body mass (1000–2499 grams)
P07.2 very premature newborns (pregnancy term <28 weeks/<196 days)
P07.3 premature newborns (28–36 weeks/<256 days)

Prematurity classification is different across countries. Many leading European countries standardizes reproduction data based on pregnancy term, since research of the first trimester standard helps determining exact pregnancy term with ±3 day precision (Klimont, J.2012).

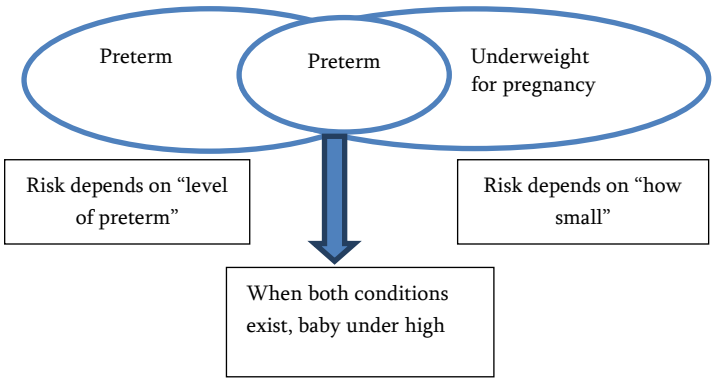
It is important to know what are the criteria used by the country to determine prematurity, since it defines the condition of the given country in relation to this phenomenon. For example, Austria, based on one of the criteria, used to have the highest preterm delivery rates, but change of criteria showed different statistics of this country (Helmer, H. 2007).

Clinical, evidence-based actions, including research of the lung function of the infant, tokolysis, antenatal transportation, transfer to neonatal intensive care unit is done depending on the pregnancy term. As a result, newborns are classified based on the pregnancy term (Helmer, H. 2007). The most desirable "Gold Standard" for determining pregnancy term is early ultrasound of fetus development parameters during the first trimester. Determining pregnancy term based on the menstrual cycle remains as the only standard in many countries. However, countries also use combined method of ultrasound results and latest menstrual cycle to determine the term. This algorithm is especially important in terms of reporting prematurity.

Different categories of "Small baby"

"Small baby"

Picture 1



"Small Baby" is a heterogenic group of the embryo: prematurely born with sufficient weight, timely born with low body mass compared to pregnancy term (picture 1), prematurely born with small body mass. Not all prematurely born babies are "small" and vice-versa (WHO report 2012).

According to WHO recommendation newborns or embryos with weight above 500 grams should be statistically registered.

Newborns with less than 2,500 grams of body mass are distributed into the following groups:

◊ Small body mass of the newborn: less than 2,500 grams
◊ Very little body mass: less than 2,500 grams
◊ Extremely small weight: less than 2,500 grams (Klimont, J., 2007)

Classification below is based on the data of infant morbidity and mortality.

Classification of prematurity based on pregnancy term:

Table 2

Pregnancy term (completed pregnancy week)	Name
<24+0	Extreme prematurity
from 24+0 to 27+6	Very early prematurity
from 28+0 to 33+6	Early prematurity
from 34+0 to 36+6	Moderate prematurity

Scientific literature offers recommendation, according to which lower threshold should start from the gestation age, from 22+0 weeks (Helmer, H. 2014).

Prematurity from 34+0 to 36+6 is referred to as "marginal," "average" in the literature. For this group, in 1992-2002 14% increase of incidence is in place, and these newborns are characterized with high morbidity and mortality compared to regular newborns. It was expected that this group was to be as safe as regular newborns, but unfortunately, epidemiological research proves otherwise (Helmer, H.2007).

Moderate premature newborns are 80% of the total number, while their share has increased by 15-40%, most frequently to 36+0_36+6 weeks of pregnancy. The picture changes in case of one or more variables. According to Swiss data (2008), moderate premature birth is caused by:

- ◊ 30-45% spontaneous caesuras of the uterus
- ◊ 30-35% early disorder of uterus deciduas
- ◊ 30% gynecological, or reasons of mother, or embryo (medical issues)
- ◊ 6% unknown reasons.

According to the research undertaken, it is possible to prevent later prematurity (Holland, M.G. et al., 2009).

According to the Georgian guidelines on prevention of preterm delivery and its management, preterm delivery is a child birth from week 22 0/7 to week 36 6/7. According to the same guideline, based on gestation term there are two categories of childbirth:

1. Preterm delivery at early term of gestation (22 0/7 - 33 6/7 weeks)
2. Preterm delivery at later term of gestation (34 0/7 - 36 6/7 weeks)

Risk-factors of pre-term delivery – review of epidemiological research

There are various epidemiological studies conducted internationally on preterm delivery, but the intensiveness of researching this issue is very low compared to others. Therefore, defining risk-factors is also under a question. Scientific research on preterm delivery is followed by heterogeneous results. The reason for different countries could be:

Strictly different social and public characteristics
Formats of provision of various medical-gynecological services
Pregnancy management under the conditions of various healthcare and regulation systems
Various risk groups
Various intervention opportunities.

Study of prematurity pathogenesis and mechanism requires revision of epidemiological data. Various factors that are associated with components of a mother, father, and embryo separately, or in combination, are linked to this phenomenon.

Preterm delivery epidemiology is focused on identification of risk-factors, finding information and experience on how to intervene on an early stage to optimize prematurity.

However, there are many components listed in the literature that seem to be of multi-causal nature. Often the risk is associated with physical and spiritual comfort of a pregnant woman. Social and economic situation of a pregnant woman, workload and stress situation in combination can be vital for the health of the mother as well as the baby.

Risk-factors often remain unknown in case of spontaneous preterm delivery. Some of the known risk-factors are complex, and are not studied well yet.

Based on selective review of PubMedi literature using keywords "preterm delivery," "preterm birth," "tocolisis", 1996-2002 relevant randomized research conclusions, systematic resumes and meta-analysis, European, British and US scientific unions have named various separate and combined factors for premature birth. (Murphy, D J. 2012).

Infections

Connection of infections with premature birth is supported by the following assumption: bacterial infections reach into uterus and amniotic fluids, result into inflammation and early compressions of the uterus or rupture of the embryo membrane. According to Goldenberg et al. (2000), about 80% of pregnant women until the term of 30 weeks and 30% of those until the term 37 weeks have tested to have bacterial infections in amniotic fluids.

infections in amniotic fluids.

Chronic stress

According to empirical data of prospect survey of the population, in cases of social and spiritual tension caused to pregnant mothers as a result of stressful situations, newborns are either significantly underweight, or are born before 37 weeks, since stimulation of hypothalamus-hypophisis-kidney gland stimulates childbirth process.

Studies show that corticotrophin hormone in placenta is linked to spontaneous early delivery. According to Scandinavian body of research, stressful life situations and preterm delivery are in direct connection with each other (Austin, MP & Leader L 2000).

Heavy reproduction anamnesis

Probability of preterm delivery in case of previous preterm delivery is 20%, and 40% in case of two previous cases (Winckel, U.C 2010).

A study of 150,000 deliveries conducted in the US showed that previous record of spontaneous preterm delivery with one baby creates a high risk during the next delivery (OR 3.6 ; 95% CI 3.2-4.0). Same correlation was identified for women that had iatrogenic preterm delivery (OR 1.6 ; 95% CI 1.3-2.1). These pregnant women have the biggest risk during the same gestation period of future pregnancies (Anath ,C.V. 2006).

Multiple gravid (about 10% of all premature born babies)

According to Swedish population registry, coefficient of preterm deliveries are reduced in case of one baby, but are increased in case of more than one gravid (Morken NH, 2005).

Surveys in Taiwan show that women with less than 12 month interval between pregnancies are more prone towards preterm delivery (OR 4.2; 95% CI 3.0-6.0) (Slieh TT, 2005). The risk decreases when interval between pregnancies increases to 18-49 months (Krymko H, 2004).

Inconvenient socio-economic conditions.

According to studies in Scotland, 1980-2000 analysis, increase of preterm delivery risks(risk change OR from 1.52 to 95% in 80-ies CI 1.44-1.61 OR 1.75 ; 95% CI to 1.65-1.86 towards the end of 90-ies) was associated with worsened social situations (Fairley, K. 2006). European body of research cannot determine correlation between working mothers and preterm delivery, but unhappiness with the workplace is significantly related with preterm delivery.

Pregnancy below the age of 18 and above 35

Age of the mother is an important factor for health of the baby. This concerns premature births as well (SOEPpaperson Multidisciplinary Panel Data Research, 2010).

There are different data concerning the young age of the mother and preterm delivery. Study from Brazil showed high prevalence of teenage pregnancies (29%), when comparing pregnant women of under 18, 18-19, and 25-29 years of age. Risk of preterm delivery was high amongst pregnant women under 18 (OR 1.7; 95% CI 1.02-3.08), but the risk was no higher than that of 18-19-year-olds. This could indicate that the link between young mothers and preterm delivery could be resulting from genetic factors (Eure ,CR.; Lindsay, MK. & Graves, WL. 2002).

Weight of the pregnant woman

BodyCare research (Germany) shows that weight of a pregnant woman, social status, and alcohol consumption are in direct correlation and pose double effect on preterm delivery. The survey shows that 3.1% of pregnant women with problematic level of alcohol consumption is mainly of low social status, and overweight (Dudenhausen, J. W.; Kirschner, R. 2011).

Systemic analysis of epidemiologic surveys show that extreme weight of the mother during pregnancy and preterm delivery are connected to each other through three anthropological lines: BMI, weight increase of a pregnant mother, and height of a mother. This study showed exact linkages between these factors. Main criticism came from formulation of outcome for pregnancy before 37 weeks, and recommendations were made to define 32-34 weeks for pregnancy outcomes.

Other studies assessed combined effect of BMI before pregnancy and weight gain during pregnancy for two categories of preterm delivery – 20-21 weeks and 32-36 weeks (Dietz, PM.; Callaghan, WM., 2006). Correlation between little weight gain and very small premature babies was established, which was especially obvious for very thin women (adjusted OR 9.8, 95% CI 7.0-13.8). Mothers with significant weight gain during pregnancy showed twice as many odds together with giving birth to premature children.

Physical activity before pregnancy, regardless of BMI is correlated with weight and weight gain, but it should be differentiated according to physical activity.

Study of low income women of the US showed that free activeness during ≥60 days of the first and second trimester is a protective factor of preterm delivery (less than 37 weeks of pregnancy) (OR 0.51, 95% CI 0.27-0.95). However, the risk of preterm delivery increases if pregnant women have to use stairs more than 10 times a day (OR 1.60, 95% CI 1.05-2.46) (Misra, DP.1998).

Sex of the premature newborn

Norwegian studies show that male premature babies are significantly more prone to death in their childhood than females; both of them lack of reproductive skills, and females are prone to bearing premature babies themselves.

More boys are born prematurely. Number of male premature babies is 14% higher compared to females. Premature boys are also more prone to cerebral disorders and have less academic achievements than girls. Scientists explain this with the reason that in case of male embryo mothers suffer more placental issues, and therefore, infections and eclampsia is more intensive. Female embryo develops faster, and its lugs are better developed (Swissmom Newsticker, 4.10.15).

Nutrition during pregnancy

Chinese research suggests that women that take multivitamins before pregnancy, have less risk of preterm delivery (OR 1.59, 95% CI 0.12-2.76 and OR 0.40, 95% CI 0.12-1.40).

In western population, the importance of Omega 3 as a secondary prevention for increasing the length of pregnancy was proven by studies (Facchinetti, F.; Fazzio, M. & Venturini, P. 2005).

Consumption of coffee during pregnancy

This factor was investigated by Italian study of 2000 pregnant women through case-control mechanism, which showed that low dosage of coffee is not linked to preterm delivery (Chiaffarino, F.; Parazzini, F.; Chatenoud, L. et al; 2006).

Unhealthy lifestyle

There is a lack of information on life conditions and lifestyle of pregnant women (Kirschner, K. 2013). Older gravidas with modern lifestyle, attitudes towards starting a family, lowering support to already existing families, breaking relationship stereotypes, especially in large cities, social inequality factor, psychological attitude of women during pregnancy – all of these factors reflect on preterm delivery.

Lifestyle is determined by following criteria: personal decisions, external factors, socio-cultural and economic factors.

Lifestyle can be of two types, as it applies to reproductive function:

1. Those that start families in early ages are less informed on family planning and often end up with large families under inconvenient social conditions
2. Those that first plan career, social stability, and then start family and have children.

Both types of families have both advantages and risks.

Criteria for healthy lifestyle are: average weight, food filled with vitamins and minerals, spiritual stability, good sleep, participation in healthcare prevention programs, leading life free of alcohol, nicotine, and drugs, stable family structure, social support, active rest (sport, music). Lifestyle, which negatively reflects on the health of a pregnant woman is: stress and social tension, tendency towards psycho-pathological, immunology factors for infectious diseases. Study in the US shows that during the period of 2001-2009 number of women leading healthy lifestyle increased from 7.3% to 21.2% (Goeckenjan, M. 2012).

Picture 2

Studies allow to conclude that population of pregnant women experience nutrition issues. This is especially true about supply of iodine, folic acid and iron. Lack of such microelements is linked with preterm delivery alongside with other diseases (Friese, K. Dudenhausen, 2003). Partially, it also results from lack of awareness.

Conclusion

There are many clues to the aetiologies of preterm labour within carefully conducted epidemiological and environmental studies. It is clear that no single approach will be effective for prevention or treatment as there appear to be complex interactions between maternal anthropometry, environmental exposures and genetic susceptibility of the mother and fetus. A careful antenatal booking history can screen for risk factors for preterm delivery, although the predictive value and specificity of scoring systems are poor.

A combined approach to research encompassing epidemiology, pathophysiology and clinical care is required to understand the aetiologies, prevention and optimal management of preterm delivery.

A coordinated research approach that brings together the disciplines of epidemiology, laboratory based science and clinical trials offers the best hope of significant advances in this important aspect of perinatal care.

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Maternal and Child Health Trends in Georgia

Nana Jincharadze

The University of Georgia, School of Health Sciences and Public Health
MD, PhD in Medicine, PhD student in Public Health

Summary

The protection of maternal and child health and clinical effectiveness of their medical services is largely dependent on pregnant women's antenatal and postnatal services and is one of the key priorities of the health care system in the country. Global health statistics in Georgia has been observed in maternal and infant mortality rates on a downward trend, but the situation is still important. In the 1990s while developing market economic, post-soviet country Georgia was one of the first which began reform in health care system. While this reform the maternal and child health care programs become priority. Antenatal surveillance service of pregnant women has been granted to beneficiaries since 1996. In recent years, financial services access to antenatal growth (Ministry of Labor, Health and Social Protection Ministry of mothers and children in the program, which funds antenatal care visit 4) timely referral of pregnant women has led to an increase in primary-care settings. Despite increasing of receiving antenatal treatment, pathological child delivery was also increased. If we compare the situation of maternal health for a better assessment of the National Center for Disease Control and Public Health, published by the statistical data (2000 -2014 years), in particular maternal and child health conditions of some of the figures: it can be said that the maternal and child health indicators are still not desired. The issue is very important, for the smallest nation in Georgia, where demography is acute.

Abbreviations: *CDC-Centers for Disease Control and Prevention. WHO- World Health Organization. UNICEF- United Nations International Children's Emergency Fund. UNFPA - United Nations Fund for Population Activities. CIF-Curatio International Foundation. HIV- Human Immunodeficiency Virus.*

Key words: *Mother, child mortality, antenatal care, stillbirth, perinatal mortality rate, maternal mortality, deliveries.*

One of the major priorities of the National Health Policy is maternal and child health care in various countries. It's a leading program for the World Health organization. Despite big effort, the result is not good enough. According to the Millennium Development Goals, this results were not fully accepted. From 1990 till now, maternal and child mortality has declined in many part of the world, but not as much as 2/3 as it was expected. Improvement maternal and child health is priority for the world. Popular organizations, CDC, WHO, UNICEF and UNFPA, published interesting statistic in 2015 year. According to this statistic: Child delivery accompanied by antenatal care and qualified medical personnel increased to 71% (in 1990 year it was 59%). Despite this progress there are many problems in this sphere, that's why 800 girl and woman die every year because of problems connected with pregnancy and child delivery. Globally, statistic of children death under 5 year age, was decreased from 12.7 million (1990) to 6.6 million (2013). Despite this, 17 000 children under 5-year age die because of reasons which may be avoided. According to researches 200 million child has no opportunity of developing and using their potential (1).

For more clarity it is enough to mention the plan that for 2030 year, third goal from 17 goals is reaching peoples health, welfare and healthy life for every person. while preventirebadi mortality reduction of 13 from the goal to the forefront of the maternal and child mortality, which is one indicator of antenatal Service indicator.

Global health statistics in Georgia has been observed in maternal and infant mortality rates on a downward trend, but the situation is still important. In the 1990s while developing market economic, post-soviet country Georgia was one of the first which began reform in health care system. While this reform the maternal and child health care programs become priority.

After Georgia's independence, many reforms have been implemented, which can be divided into four periods:

1989-1995 – period of inertion;
1995-2003 - First period of reforms
The second period of reforms in 2004-2012
From 2013 to the third period of reforms.
From 2013 - the third period of reforms.

The government of Georgia during 25 years of independence, carried out a number of reforms. There have been developed, many legislative and policy documents, ex. the Law on Health Care; Law on Patients' Rights The law on breastfeeding. Convention on the Rights of the Child, the Convention on discrimination against women in all forms of eradication and the Millennium declaration. The government of Georgia as a contracted party of millennium goals document and took the responsibility that in 2015-year mortality statistic of children under age 5, will be decreased fo 2/3, compearing with the statistic of 2000 and mortality of mother will be decreased to ¾. For this goals state program includes, free examination of pregnant, with voucher system, financing child delivery, additional financing pregnant under high risk and financing medical treatment of children under age of 3 (2).

Period of inertion includes 1989-1995. The healthcare sector in Georgia was in fact conditioned in 1992-1994, which was later reflected in 1-2 years of maternal and child health, in 1995 compared to 1990, maternal mortality was doubled from 20.5 to 51.1, and in 1997 the maternal mortality rate Reached 70.1. Infant mortality rate - 28.6. The Government of Georgia, with the support of the World Bank, began working on health care reforms in 1993-1994.

The first period of reforms began in 1995-2003, on December 23, 1994, the Head of State issued a resolution N400, where the concept of rehabilitation of health care system was announced; All aspects of the first phase of rehabilitation of health care system were presented as 11 points (beginning 1 January 1995). The share of health expenditures in the state budget increased: 4,4% in 1996, 6% in 2003, and the state share in health spending was 11,6% in 1996 and 18% in 2003. But less was the WHO recommendation the number (4).

At the first stage of health care reform, the needs of the population in health care and the possibilities of meeting these needs were identified in the agenda to determine the package of medical services that the population would provide to the population. The government has reviewed their possibilities and the Millennium Development Goals as a participant countries pledged to the 2015 Statistics of 2000 compared to children under five and infant mortality up to 2/3, while the rate of maternal mortality would be decreased with ¾. The government was trying to achieve these goals by using a series of state policies. Including primary health care system in the ambulatory level of maternal and child health by improving the delivery of essential services, in particular, the government has developed and launched a maternal and child health care programs, which included: antenatal care, antenatal visits and medical examinations, which conducting state funding. As well as financing women delivery childbirth by natural and caesarean way. Program also financed Pregnant women with higher risk in antenatal and postnatal period and children under the age of three.

Since 1996, the government began funding 4 antenatal visit in 1999, the National Health Policy has been developed as the main political document, which was presented to 10-year goals for improving the health of the population and plans for the identified priority areas, based on the causes of mortality and morbidity, coverage of population And economic efficiency. The Government of Georgia announced maternal and child health as a priority direction and aims to reduce maternal and child mortality by improving antenatal and perinatal care (6).

In 1995-2003 virtually chaos created a health system that was closely associated with the traditions of solidarity, equality, and universalism, although the wishes declared on the paper did not correspond to the economic reality. In 2002, the World Bank's assessment of Georgia's health care system revealed a high rate of maternal and child mortality as one of the major challenges (7).

In the second period of reforms in 2004-2012, a concept was developed, which meant replacing universal programs with targeted programs, ie "selectivity" and geographical and financial availability (2).

And in 2005 the state funded mainly antenatal care, childbirth and neonatal care, however, as the analysis showed, the service even within the framework of public health programs financed from the patients of paid services to nearly 75%. 2006 CIF held by the staff the perinatal care evaluation and research revealed that there was a low level of awareness among pregnant women in the first visit to the consultation in terms of appeal, depending on the needs and availability of laboratory studies. Almost 53% of the antenatal patients indicated that they paid for services that were subsidized by the state, while the number of visits to obstetricians-gynecologists was 3,8, instead of 4 visits (2).

Thus, antenatal service for the adoption of a financial and geographical barriers, as well as with regard to quality of infrastructure and equipment was problematic. With the current problems developed framework document of reproductive healthcare of Georgia. which was reflected in the reproductive health guidelines key principles and practical issues. Primary state health care program, which was the beneficiary of the whole population, the state would cover the following types: ante and post-natal care and family planning services (8).

The government in 2006 began to implement the reform, which was focused on the health and development of the family doctor, which included perinatal care reform as well as the most effective way to improve the outcome and broadening of state programs (8).

In 2006-2007 was identified the main directions of the health sector, which was aimed to improve the system and reach the recourses with wisely managing limited recourses. State offered people free medical service and it was determined by state program of healthcare, In particular State outpatient program, state program for children from 0 to 3 year, State Obstetrician program and referral program.

Antenatal surveillance in the "State Outpatient Program" implies the following: During the program four free antenatal visits were conducted during pregnancy. The first antenatal visit should be conducted during the 13 weeks of follow-up visits, 22, 30 and 36 weeks. Interventions included overall blood analysis, protein determination in the urine, syphilis test, blood group and Rh tests, Vaginal smear bacteriological research, HIV testing for the first prenatal visit and the ultrasonic examination on the second visit (added in January 2005). The pregnant woman had to pay in case additional intervention would have been necessary (2).

Later, maternal and child health programs have changed slightly, and the mortality rates of maternal and infant mortality have decreased. The protection of maternal and child health and clinical effectiveness of their medical services is largely dependent on pregnant women's antenatal and postnatal services and is one of the key priorities of the health care system in the country. The World Health Organization's recommended antenatal care visit 4 Full coverage of the last decade, a growing dynamic in 2009, the Women's consultation period up to 12 weeks of pregnancy only 53.3% were employed full consultation 4 on a visit to the 78.5% of respondents (9).

By 2011 this index was 81.6% (10), In 2009, child delivery by caesarean method has increased and was 28.7% from total amount ot child delivery. Amount of primary Caesarean section operation was, 67.9%, between them, 52% -was urgent, obstetrical forceps was used in 82% and vacuum extraction was used in 149 cases (9).

Since 2013 began the third period. In order to provide financial and geographical access to the healthcare services, the Government has implemented the Universal Health State Program (Government Resolution 36). This reform of healthcare, which was an attempt to universal health care.

From 2017, the state has chosen a selective approach as more rational and effective.

Maternal and Child Health, which is one of the most important indicators of the health of the population, provides a special place and is always the subject of state care. The main cause of women's mortality in reproductive age is the further complication of pregnancy and childbirth. According to WHO, in 2015, around 830 women in the world have died due to complications related to pregnancy and childbirth, and these cases are 19 times more frequent in developing countries than in developed countries. The majority of cases are preventable at risk in time of manifestation and appropriate intervention (11).

According to the WHO's International Statistical Classification (ICD-10), "Death of a mother means death, pregnancy or 42 days after the pregnancy cessation, regardless of the pregnancy, related or maternal or mental health, but not for accident or other reasons that are not associated with pregnancy" . ICD-10 explains the mother's late death as "the death of the mother for direct or indirect maternal cause from the abolition of pregnancy from 43 days to 365 days".

Maternal mortality preventable reduction and elimination among other activities, one of the necessary and the continuity of the pregnancy monitoring antenatal surveillance (12). Antenatal surveillance service of pregnant women has been granted to beneficiaries since 1996.

In recent years, financial services access to antenatal growth (Ministry of Labor, Health and Social Protection Ministry of mothers and children in the program, which funds antenatal care visit 4) timely referral of pregnant women has led to an increase in primary-care settings. If we compare the situation of maternal health for a better assessment of the National Center for Disease Control and Public Health, published by the statistical data (2000 -2014 years), in particular maternal and child health conditions of some of the figures: it can be said that the maternal and child health indicators are still not desired . Based on official statistics, the maternal mortality rate in Georgia decreased from 49.2 to 23.4 per 100,000 live births in 2000-2005, compared to 2000-2002 in 2003-2005, with a maternal mortality rate dropped from 51.5 to 40.3 per 100,000 live births.

Maternal mortality on every 100,000 live deleivered child increased from 14.3 to 31.5 according to 2008-2014 year statistic. From 2004-2008 years this statistic was decreased from 43.3 to 14.3 and in 2004-2014 years it was decreased rom 43.3 to 31.5 (5).

Child delivery by caesarean method in Georgia has also increased. From 2000 year it was increased with 4.3 and in 2015 year percentage of child delivery by caesarean method was 41.4%. Between disorders that precede or develop during pregnancy and complicating pregnancy, childbearing and aging, the greatest share is anemia (29%), Urinary - genital diseases (16%) and thyroid gland pathology (12%). During the reporting period due to the pathology of pregnancy were hospitalized between 3269 woman. While antenatal period statistic of delivering dead Childs is:

- 31% on the pregnancy of 22-27 weeks
- 27 % on the pregnancy of 28-33 weeks
- 13% on the pregnancy of 34-36 weeks

29% on the pregnancy of 37-41 weeks

The number of pregnancy and child beings delivery was decreased. Despite increasing of receiving antenatal treatment, pathological child delivery was also increased (5).

According to the 2016 year report of Ministry of Health, 24 pregnant woman died in 2015. 21 deaths (87.5%) were classified as maternal deaths related to complications of pregnancy, childbearing and 21 cases of maternal death, 19 cases were confirmed by early maternal deaths (mother's death at 0-42 days), and in 2 cases the mother's late Death (mother's death from 43- 365 days In a). Thus, according to national data, the maternal mortality rate in 2015 was 32 / 100,000 live (13).

According to the latest data, the Maternal and Child Health Sector in the Health Care System of Georgia is represented by 248 outpatient and polyclinic, 29 women consultation, 36 outpatients with 34 maternity houses (5).

Maternal and child health issues are actual, urgent and priority for state. It is also proved by 2014-2020 conception of health care promotion, in the sphere of maternal and child health. According to this conception maternal and child health care is in 10 priority issues of health care policy. (13).

In 2017, the World Health Organization has developed a recommendation for antenatal care renewal clinical recommendation 39 new recommendations aimed at maternal and child mortality reductions. Maternal mortality, considered as a priority in the development of the Millennium Development Goals, is a leading destination for sustainable development goals (14,15,16).

In 2017, Maternal and Child Health was once again recognized as a priority and with the technical support of the United Nations Population Fund (UNFPA) and the United Nations Children's Fund (UNICEF) under the guidance of the Ministry of Labor, Health and Social Affairs, a long-term strategy for the prevention of maternal and infant mortality and prevention of childbearing will be developed by 2017-2030 years A 3-year action plan (2017-2019). The governmental sector is considering improving the health of maternal and newborns and developing innovative policies to reduce the maternal and infant mortality, despite the decline in maternal deaths over the last decade, Georgia is far behind the same indicator of European countries.

Therefore, the issue is very important, for the smallest nation in Georgia, where demography is acute. The need to conduct a scientific study in order to establish the reasons for the improvement of maternal and child health indicators based on reliable evidence; It is need to conduct a scientific study in order to improvement of mother and child health indicators and for established a Relevant recommendations. Our vision of the problem is consistent with the strategy set by the government, and the challenges in the world and the goals of sustainable development and this is great benefit for the Georgian population.

Conclusions:

1. Maternal preventable mortality reduction and elimination among other activities, one of the necessary and the continuity of the pregnancy monitoring antenatal surveillance.
2. Despite the decline in maternal deaths over the last decade, Georgia is far behind the same indicator of European countries.
3. In order to improving the health of maternal and newborns and to reduce mortality of maternal and infant, it is necessary to developing innovative policies.

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Perspectives for improvement of medical services in Georgia through accreditation of hospitals

Teona Gorgadze[1], Otar Vasadze[2]

The University of Georgia, School of Health Sciences and Public Health
[1]PhD student, Public Health; [2]Supervisor, MD, PhD, Associate Professor

Summery

Implementation of the universal health care state program has significantly increased the financial availability of the Georgian population on medical services, however this process caused some problems to medical service suppliers, which was expressed in the misunderstanding generated by the settlement. Despite all of this, Georgian population still does not have high quality medical services. Although some changes are made to new health care providers to improve the quality of health care and facilitate access to it, but the changes do not include a number of important aspects of the treatment process – improving the qualification of medical personnel, number optimization, patient safety, the necessity and use of recommendations (guidelines) and disease management standards (protocols) of clinical practice. While some of the guidelines are developed, it is not institutionalized. Thus, the subject of discussion is wither the high quality hospital services will be available. Competences such as: 1. Increase of clinical quality and at the same time gain confidence in patients; 2. Assess the clinical efficiency; 3. Time management to improve efficiency and forecast; 4. Establishment of evidence based medicine and etc. Play decisive role in development of the hospital. Implementation of all the above mentioned activities will only be possible through the introduction of the quality management system.

Keywords: *accreditation, certification system, quality of healthcare, hospital accreditation.*

Overview

Development of quality management systems and implementation of its control are vital for all countries, especially for developing countries with limited resources providing the population with the minimally necessary medical services. For experts in healthcare system of any country in the world, the efficacy of medical institutions and the quality are key healthcare management problems.

Along with the economic changes in the country and the implementation of health reforms, its significance increased significantly. Establishment of a medical market, introduction of a health insurance system, establishing a legal base for the protection of patients' right to high quality medical care will push medical facilities to more efficient use of existing resources and stimulate the quality and intensity of the work of medical personnel.

Permanent increases of health care expenditures and medical services have deepened interest in the quality of medical care, because the quality of services is actually an opportunity to control costs and provide optimally better services at the same time.

Based on the above, managers of medical facilities are interested in using the methods of evaluation and analysis of the quality and efficiency of the medical personnel, its structural subdivisions and institution's work.

There are many definitions of healthcare quality: The institute of Medicine defines healthcare quality as the extent to which health services provided to individuals and patient populations improve desired health outcomes. The care should be based on the strongest clinical evidence and provided in a technically and culturally competent manner with good communication and shared decision making (The Institue of Medicine – IOM); The quality of healthcare means the right actions (what), for the right person (who), at the right time (when) and the right actions during the first intervention (Department of Helath, UK, 1997); Quality is the kind of care which is expected to maximize an inclusive measure of patient welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all its parts (Council of Europe); Quality of care is the level of attainment of health systems' intrinsic goals for health improvement and responsiveness to legitimate expectations of the population (WHO).

The quality of medical service is the combination of certain characteristics that can be assessed to meet the needs of the patient (population), its expectations and the modern level of medical science and technology.

The quality of medical service implies not only carrying out appropriate activities in accordance with the standards, but also the following:

- ◊ Safety;
- ◊ Acceptable expenses;
- ◊ Activities to reduce the mortality, morbidity, becoming an invalid and etc.

Quality of medical care is to maintain the quality of service through determination of compliance with the standards and rules of exploitation of medical facilities and equipment and licensing or certification of quality if professionals. (O. Vasadze, Z. Janelidze, L. Kobaladze, 2002).

Quality- oriented health care is a safe, effective and efficient medical service, that will respond to health care requirenments. These requirements are complex that has been achieved by implementing accreditation of hospitals in a number of countries. Accreditation is an official procedure through which the authorized body evaluates and recognizes that the organization, program or group meets the requirements set by the standards. Accreditation of medical institutions is the evaluation of the work process of the medical institution according to the predefined standards. Accreditation continues to require permits and licenses by requiring continuous improvement of quality from medical institutions. Unlike the permit, accreditation will be issued for a certain period of time and the institution must re-evaluate it for its renewal. Although the permits are under the responsibility of the state, the accreditation is governed by an independent, non-governmental organisation in the majority of developed countries. Accreditation is directed to patients, their families and other users with the most safe, cost-effective and supportive support, using the planned and developed approach based on existing data. It includes systematic and continuous assessment of patient care and other supporting processes in order to demonstrate efficiency improvement capabilities and timely implementation of appropriate measures.

Nowadays acquisition programs are being implemented by professional associations or state level governing bodies in different countries. According to the study by the Ministry of Health in Belgium in 2007, 11 of 17 accreditation programs are based on ISQua (International Society for Quality in healthcare) standards.

Some accreditation organizations have established independent assessment and accreditation programs worldwide for example: Canadian accreditation program- ROP- Required organisational Practices, German accreditation program- KTQ- International GmbH, "Cooperation for transparency and quality in healthcare ", accreditation program in Asia- The Saudi Central Board for Accreditation of Healthcare Institutions – CBAHI, accreditation program in Australia- "The Australian Council on Healthcare Standartds- ACHS", accreditation program in UK- The National Gold Standards Framework – GSF.

Accreditation schemes for hospitals are as follows:

- ◊ Accreditation Association for Ambulatory Health Care (AAAHC)- USA;
- ◊ Accreditation Association for Hospital/Health Systems (AAHHS)- USA;
- ◊ Caspe Healthcare Knowledge Systems, CHKS Ltd, www.chks.co.uk;
- ◊ Malaysian Society for Quality in Health, MSQH- Malaysia;
- ◊ "QHA Trent Accreditation", UK-Europe;
- ◊ "Australian Council for Healthcare Standards International", or ACHSI, Australia;
- ◊ Accreditation Canada, CCHSA,"Canadian Council on Health Services Accreditation", Canada;
- ◊ Healthcare Facilities Accreditation Program (HFAP), USA;
- ◊ Joint Commission, USA;
- ◊ Community Health Accreditation Program, CHAP, USA;
- ◊ Accreditation Commission for Health Care, ACHC, USA;
- ◊ The Compliance Team: "Exemplary Provider Programs", USA;
- ◊ Healthcare Quality Association on Accreditation, HQAA, USA;
- ◊ DNV Healthcare Inc. DNVHC, Norway and USA;
- ◊ Thailand Hospital HA, Bangkok, Thailand;
- ◊ "Taiwan Joint Commission on Hospital Accreditation", Taiwan;
- ◊ " La Haute Autorité de Santé", France, Paris;
- ◊ "National Commission for Accreditation of Hospitals", Bucharest, Romania;
- ◊ "American Accreditation Council", (ACC), USA.

After the collapse of the Soviet Union in Georgia "Semashko" healthcare system remained. The long and complicated process of his reforms began in the 90th. The first phase of reforms began in 1991- 1994. On the background of economic, social and political crisis, the health care system is almost completely eliminated. It should be noted, that if during the Soviet period the state spent about 130-135 dollars per person, during the crisis period the index fell to 0.45- 0.8 $.

Right to access to quality medical services was reflected in the Georgian legal space as well as in the next stage of the establishment of the independent state of the country. Paragraph 37.1, Constitution of Georgia (1995) states, that " everyone has the right to brnrfit from health insurance, as with available medical assistance, free medical care is provided in the conditions defined by the law. According to the Constitution, "Every person is free and born before the law regardless of race, color, language, sex, religion, political and other views, nationality, ethnicity and social origin, property and title status, place of residence" (paragraph 14).

The work on health care law started in 1995. On December 10, 1997 the Parliament of Georgia adopted the bill with the third reading. The law has to fill the vacuum in the healthcare system. "The law on Health Care" included all the basic principles relating to various aspects of patient's rights, among them patients' social rights. The law reflects the right to access the patient's quality medical service and is associated with the quality of medical services and patient safety.

In this period the system began to decentralize, financing sources have changed, primary healthcare has developed, system has been oriented on population needs. In the first phase of the reforms, the state of the population still remained hardest.

Changes in "Healthcare law in Georgia" in 1997, about the existence of a continuous medical education system is an important tool for quality, unfortunately this regulatory mechanism is weakly used in Georgia.

According to the "Healthcare law in Georgia", paragraph 16, point b): one of the mechanisms of state health care management is the quality control of medical supervision, and according to the paragraph 63 " quality control of medical activity of all medical institutions is maintained by the Ministry of Health".

The third part of healthcare reform in Georgia began after the "Rose revolution", one of the main objectives was the rehabilitation and development of the hospital sector.

Drastic changes in healthcare system occurred in 2004-2006. Targeted medical bills and health insurance state structures have been canceled, as a result funding of state health care programs has become the prerogative of the state budget. Massive privatization of medical institutions started, as a result there are no primary health care facilities or hospitals in the state ownership.

Social tax was introduced in 2005, that was directly in the budget and health care was financed from the budget, but the tax was revoked in 2008.

"National program of hospital sector" developed by the Government of Georgia in 2007 envisaged construction of 100 new hospitals. According to the plan, 100 new multiprofile hospitals must have been built, most of them will be located in the regions and 30 minutes could be enough for transportation. The general plan defined the necessary requirements for hospital building and medical equipment. Because of war in 2008 and other different reasons the objectives planned in this reform could not be done.

Privatization of the hospital sector on the basis of resolution #85 of the government of Georgia, March 30, 2010, contacted insurance companies for the health insurance program for the vulnerable. One of the essential provisions for participating in the state program for insurance companies was to provide modern standards for hospitals.

On December 17, 2010, the government of Georgia adopted resolution #385, "On approval of the Regulations on the Rules and conditions of Issuance of Permits for Medical Licenses and Permits". The system of permits for inpatient institutions has been developed to ensure patient safety. For the purpose of controlling the quality of medical services, the State Regulation Agency for Medical Activities performs the examination of the licensing or permit conditions in accordance with the legislation. (T.Verulava).

The new plan of 2010 envisaged 26 "medical regions" with modern hospitals. The winner company in the region was obliged to serve the beneficiaries of the state insurance program for 3 years. In addition, the company will have to build the hospitals with new standards from the first of December, 2011. Despite the fact that the government was continuously negotiating with investors and donors, the project failed.

From September 2012, internal system of assessment of quality improvement and patient safety has been initiated in order to imrove the quality of medical services. On May 14, 2012 the Government Resolution # 180 was adopted for the purpose of introduction of medical practice based on evidence, " Grant Program for Development of State Standards (Protocols) for Clinical Conditions Management" (Georgian Resolution # 180), within the framework of the openly announced grant competition, the state standards of the clinical state management (protocols) projects will be selected and funded; Competition commission defined the protocol's recommendation format, project assessment criteria; The monitoring of practical use of guidelines is provided, which will help improvement of the clinical outcomes (T. Verulava).

The repot (2013year), of the Ministry of Health and Social Affairs states that the level of the patients' satisfaction is determined by the availability of high quality and safety medical services, sensitive dependence of patients, with different aspects of the received medical services. The results of the study about the use of medical services and healthcare expenditures show, that the satisfaction level of patients is high (over 80%) towards important aspects of care, such as giving adequate explanation on the causes of treatment and adequate timing for patients.

On February the 28th in 2013 "The Universal Healthcare Program" came into action. The mission of the program was to provide financial access to medical services for the population of Georgia without insurance. The program embraced more than 2 million citizens, who had no health insurance for that period.

As a result of the program, all citizens of Georgia have been guaranteed financial access to basic medical services with universal health care or state and private insurance programs.

The state program for universal health care was carried out in two stages. The first stage was from the 28th of February until the 1st of July, 2013, which meant the primary/ healthcare services of the family/ district physician services and emergency care at both outpatient and inpatient levels. Within the framework of the program, over 450 emergency care services were financed.

According to statistical data:

1. 1 347 658 persons were registered for planned outpatient and polyclinic services from the 1st of February including the 1st July;
2. In the same period 41 713 citizens received emergency out-patient services, 15 275 ones urgent hospital care.
3. Over 80% of the active hospitals across the country have been involved in implementing the universal health care state program. (Ministry of Health and Social Affairs, 2013).

The second stage of the program began on the 1st of July, 2013, which gave citizens 6 blocks instead of 3 blocks of medical care, particular:

1. Extended services for primary healthcare.
2. Urgent outpatient care.
3. Extended urgent hospital service.
4. Planned surgical operations.
5. Treatment of oncology.
6. Childbirth.

In addition, the above mentioned services have significantly expanded the capacity of health care and urgent care. For example: Consultations of family doctors plus 7 other specialists and increased list of laboratory and diagnostic services.

It is noteworthy, that in case of discontinuance the agreement of private insurance for any reason, the citizen was admitted to the universal health care program and he could receive both a family or a district doctor's health service and a nurse service free of charge; also basic laboratory services, urgent outpatient and in- patient services provided by the list has been fully funded (Limit of 15 000 GEL for each case).

During the five months of the year 2014, more people have benefited from the state healthcare program, than during the eleven months of the year 2013. During the period, more than 22.1% of patients received inpatient care, 74,5% received surgical service and more than 35.8% received cardiovascular surgery service. As for chemistry, hormone and radiotherapy the number of beneficiaries is increased by 89,9%. (Ministry of Health and Social Affairs, 2014).

First steps of hospital accreditation in Georgia have been made in 2006 , when with the help and support of the special working group at the Ministry of Labor, Health and Social Affair, CoReform, business climate reform projects and USAID US group of experts have been invited in order to make first steps for creating the accreditation system of medical institutions. The following document was prepared by the group - "The concept of health care permits, licensing and accreditation in Georgia". The aim of the project was to develop a voluntary accreditation system of medical institutions for the Ministry of Labor, Health and Social Affairs of Georgia for quality assurance.

Accepting the structure and recommendations given in the concept about licensing, permits and accreditation should support healthcare quality improvement in Georgia, create the fundament of modern payment structure, increased the role of medical community in healthcare quality and improve the legislative regulation of the medical industry in Georgia. The above mentioned conception included a number of solutions.

Structure and institution:

1. All diagnostic and medical facilities of the hospital should be available.
2. If the diagnostic, treatment and night care departments are located on more than one floor, the hospital should have at least one perfectly functional elevator.
3. Patients' diagnostic, treatment and night care departments in the hospital should be provided with heating and ventilation (at least ventilators).
4. The hospital should have a continuous water supply system.
5. The hospital should have a hot water supply system in all departments where patients are being diagnosted and treated.
6. The hospital should have perfectly functional toilets in all departments where the patients are treated and spent night.
7. Hospital should have fire extinguishable fire protection in all departments where patients are examined, treated and where they spend the night.
8. The hospital should have a continuous energy source, as well as fully functional electric generator.
9. If the hospital provides urgent medical care, it should have the emergency care department on the first floor and also be provided with ambulance and other transport.

The hospital should have venetian blinds on all windows of surgical rooms.

Equipment:

1. The hospital should have at least one perfectly functioning sterilizer and autoclave.
2. The hospital should have at least one X-ray, which will give the possibility to make radiographic image of the spine, chest, stomach and limb.
3. The hospital should have laboratory that provides basic surveys (such as at least blood and urine analysis, electrolytes, sugar in the blood and simple bacteriology).
4. The hospital should have at least one perfectly functional electrocardiogram.
5. If the hospital provides emergency medical care it must have at least one fully functional artificial respiration apparatus.
6. If the hospital has surgery, it must have at least one perfectly functioning device for anesthesia.

7. If the hospital has a surgical service, it must have at least one perfectly functional monitor to monitor permanent observations on vital functions during operation and anesthesia, such as pulse frequency and rhythm, pressure, breathing and oxygen content.
8. Hospital should have basic equipment (in good condition) for emergency care: such as artificial respiration apparatus, oxygen source, EKG, laryngoscope and endotracheal tubes for all ages and defibrillator, venous catheter.
9. If the hospital has a maternity, then it must have at least two incubators.
10. The hospital should have the possibility of protecting the hand hygiene (water , soap, spirit) in the areas where the patient is treated or diagnosed.

Staff:

1. The hospital should have sufficient nubmer of licensed and certified doctors to provide services within 24 hours.
2. At least one doctor always should be on duty.
3. In case of urgent care the hospital should have at least on doctor on call in all areas of specialization.
4. If the hospital has an emergency service, the emergency department should always have a nurse.
5. The emergency department should have one doctor on call if the doctor from the department is busy and other patient needs an urgent help.
6. The hospital should have sufficient number of licensed nurses, at least one should be always in each department.
7. The hospital must have enough laboratory staff to work within 24 hours daily.
8. The hospital should have enough radiologists to work within 24 hours, daily.

Processes:

1. The hospital should have self-assessment mechanism and possibility to take measures to correct found disandvantages, taking into account the existing resources.
2. The hospital should have an infection control and prevention program.
3. The hospital should open only one medical card for each patient.
4. The hospital should have a mechanism to ensure the patient's card completeness.
5. The hospital should have a process to identify and assess the dangeous processes for the patient.
6. If the hospital fails to satisfy any esential standard within the next seven days, the hospital should notify the issueing authority within the next three days (This can be put in the law and not in standards).
7. The prerequisite for obtaining a permit should be requirement, that the hospital has to carry out the patient saefety goals of the Joint Commission International.

The goals are:

Goal 1 – Right identification of the patient.

At least two methods of identification of the patient should be used, before inection, giving away the blood products, Blood or other sample for clinical examination, or before any kind of procedure. Number of patient room should not be used for identification.

Goal 2 – Improve effective communication

There should be a special procedure in the hospital showing how to get important results verbal or with telephone call. The person who receives the result of the analysis is obliged to verify the information through reading.

Goal 3 – To increase the safety of high risk drugs

Concentrated electorytes should be taken from the ward (including calcium chloride, calcium phosphate and sodium chloride > 0.9%)

Goal 4 – Elimination of the failure of wrong surgery.

- ◊ Checklist (indication paper) should be used directly before the operation to verify that the patient, part of the body of the patient is properly selected.
- ◊ Checklist of the documents (history of illness, x-ray result), tools and instruments to control, that they are available, correctly selected.
- ◊ Easily note a part of the body, where the operation should be done. This is especially important to prevent the confufion of the latter (for example right or left knee).

Goal 5 – Reducing the risk of health-related infections

Hospital staff protect the published and generally accepted hand hygiene standards.

Goal 6 – Reduce the risk of damage caused by the fall of the patient. Risk of patient fall can be assessed at certain times, which may depend on the medication received by the patient and the appropriate measures should be done to prevent from falling.

These standards should meet all institutions. The exception is the case when the institution does not carry out the services relating to this standards (For example in case of specialized psychiatric hospital).

Hospitals can be classified in several ways, namely: duration of delay, according to the type of service and control (ownership) provided.

1. Depending on the delay, hospitals are divided into short -term and long-term facilities. Short or episode is considered synonymous with "acute" type hospitals (Beafort longest Jn, Johnatan S. Rakisch). Long-term – "chronic" ones. The American Hospital Association determines short-term (acute) hospitals for those with no average delay in 30 days, but as a long –term is determined the hospitals with more than average delay in 30 days. More than 90% of the hospitals are short-term. Short-term (acute) hospitals are considered as general multiprofile, referral hospitals and as long-term hospitals are; Rehabilitation and hospitals for chronic diseases (eg psychiatric), but some emergency hospitals have departments of chronic diseases, including psychiatric.
2. Types of hospital services determine whether the hospital is general or specialized. General-type multifunctional hospitals conduct a wide range of medical and surgical services (including specialized). While specialized hospitals offer one of the therapeutic or surgical specialties. Some authors believe that pediatric hospitals also belong to specialized institutions, but there are some different opinions (which should be taken into account in case of Georgia).
3. The third classification divides hospitals according to the type of control (ownership): profitable or non-profitable, state (federal, municipal) or private. Most acute hospitals are represented as non-profit non-government organizations.

(USAID) CoReform and Business Climate Reform projects were ready to assist the Government of Georgia in implementing recommendations proposed by the United states Agency for International Development (USAID). At the same time the working version of the Guidelines for Accreditation Standards were prepared, that was based on the International Accreditation Standards of the Joint Ciommission. Over 450 standards have been developed, out of which criteria and essential standards have been elaborated. Recommendations on the amendments to the legislation were elaborated. . However it was not possible to take further steps for practical implementation of the project.

In the framework of the "Health Care System Strengthening Program of Georgia" (HSSP) Dr. Thomas Schwarz was invited in August in 2010. In the fact that hospital privatization process and that insurance companies were obliged to reconstruct or build new hospitals, Ministry of Labor, Health and Social Affairs expressed readiness to facilitate the start of accreditation of hospitals. The Association of Georgian Hospitals took over the process. There were presented 20 standards of which 13 were selected. They were used in the first phase of the pilot project, which aimed reassessing the concept of accreditation of hospitals and its implementation. 12 members of the Georgian Hospital Association attended the first meeting. 6 of them wanted to participate in the pilot project, which aimed self-assessment with the use of 13 standards. These are the following hospitals:

1. Pediatric clinic named after G. Zhvania
2. MediClub Georgia Ltd.
3. Multi-profile hospital in Khashuri
4. Tbilisi #5 Hospital-policlinic Union
5. Central Hospital of children named after Iashvili
6. Regional hospital in Gori.

Because the status of the Gori Hospital/ Ownership issue was not certain, the hospital could not participate in the program.

Because of changes in management of Georgian Hospitals Association and Ministry of Labor, Health and Social Affairs no new activity has been taken on the role of professional associations. Steps have been taken to facilitate the implementation of self-evaluation process at only 6 pilot hospitals. This includes a one-day seminar for pilot hospitals and visits from 6 to 5 hospitals (excluding Gori hospital due to the above mentined reasons). During the visits carried out in the hospital, there was a demonstration of self-assessment process, examples were shown, specific instructions and opinions were given regarding the development of the action plan. Materials were given to the hospitals, that provided the fulfillment of vacuum, which they have in relation to regulations and procedures. Also specific instructions and opinions regarding the elaboration of the acton plan were given. Only MediClub Georgia fully satisfied the 13 standards od the first phase, for the four rest hospitals recommendations were given and only one hospital, Multi-profile hospital of Khashuri has been failed. An action plan was developed for the second phase – involvement of additional hospitals in the project and increase the standards. Within the framework of the project, the seconed phase was planned for December 2010 and multi-year action plan developed for the certification of hospitals.

Each Pilot hospital should present the report in every 2 weeks to USAID, HSSP. USAID HSSP in the second period of October in 2010 should make the midterm assessment of the pilot program if necessary.

At the end of the calendar year 2010, the author of the present document should be back to Georgia and prove how well pilot hospitals satisfy the 13 standards have, but unfortunately the process was delayed for some time.

Also, the decision should be taken on further steps of the 1st phase. The proposed approach looks like the following:

1. Add other hospitals (new members of the Association of Georgian Hospitals);
2. Add new standards for pilot hospitals;
3. Both of them;
4. However the most important step will be to elaborate the local (non-governmental) organization of accreditation process;
5. Development of a "multi-year" action plan regarding the certification of hospitals. This could be done based on the project implemented within the project Co-Reform.

In addition to the appointment of the new general director of the Georgian hospitals association, it was planned to review and update the current work plan of the Association, including the measuring parameters of the pilot program development, continuation of the process of defining the obligations and management of professional associations, particularly in the following matters:

1. Certification of their members' qualifications;
2. Developing the criteria for residency program;
3. Providing continuous medical education courses (as mentioned in the report on previous visits, the course should be mandatory to ensure efficiency of any system);
4. The cost of service to the members.

Conclusion

The main criterion of all program of accreditation agencies and assessment indicator of quality assuarance means the system focused on patient , which is certainly possible through the accreditation process, however it is noteworthy that within the existing situation some hospitals will be able to pass the accreditation successfully. The steps and efforts made in this direction in Georgia indicate that the healthcare system of Georgia already has a demand for the introduction of the voluntary system of accreditation. The state made some steps in this direction and dpent financial resources. This process should have happened, as the citizens should have a guarantee theat the medical services they receive will be safe. For this the health care system should be able to prevent medical errors by facilitating elaboration of relevant legislation, clinical guidelines and flexible voluntary accreditation programs.

Based on the above mentioned problems, the aim of the planned research is to evaluate the prospect of introduction of certification system in Georgia and prepare relevant recommendations. To achieve the desired goal, the following tasks were solved:

1. Analysis of environmental quality regulating quality of healthcare in Georgia's hospital sector;
2. Comparative analysis of the current situation in Georgia and internationally;
3. Assessment of the concept of certification system, its general basics and needs of its implementation through studying the opinion of managers of Georgian hospital sector;
4. Prepare recommendations and conclusions for the creation of Quality management/ certification system for medical services in the hospital sector.

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Iatrogenesis

Maia Jikia[1], Elene Gigineishvil[2], Tamta Chitaladze[3], Nodar Sulashvili[4]

The University of Georgia, School of Health Sciences and Public Health
[1]MD, PhD, Professor,[2]DDM, PhD student, Head of Dentistry Department,[3]PhD(c) Head of the Biochemistry and Pharmacology Division, [4]DDM, PhD(c), Head of the Dental Simulation and Practical Laboratory

Summary

Safety is a global concept that encompasses efficiency, security of care, reactivity of caregivers, and satisfaction of patients and relatives. Patient safety has emerged as a major target for healthcare improvement. Quality assurance is a complex task, and patients in the intensive care unit (ICU) are more likely than other hospitalized patients to experience medical errors, due to the complexity of their conditions, need for urgent interventions, and considerable workload fluctuation. Medication errors are the most common medical errors and can induce adverse events. Two approaches are available for evaluating and improving quality-of-care: the room-for-improvement model, in which problems are identified, plans are made to resolve them, and the results of the plans are measured; and the monitoring model, in which quality indicators are defined as relevant to potential problems and then monitored periodically. Indicators that reflect structures, processes, or outcomes have been developed by medical societies. Surveillance of these indicators is organized at the hospital or national level. Using a combination of methods improves the results. Errors are caused by combinations of human factors and system factors, and information must be obtained on how people make errors in the ICU environment. Preventive strategies are more likely to be effective if they rely on a system-based approach, in which organizational flaws are remedied, rather than a human-based approach of encouraging people not to make errors. The development of a safety culture in the ICU is crucial to effective prevention and should occur before the evaluation of safety programs, which are more likely to be effective when they involve bundles of measures.

Key words: psychogenic iatrogenesis, medicinal iatrogenesis, traumatic iatrogenesis, infectious iatrogenesis, *medical errors, patient safety*

The term iatrogenesis means brought forth by a healer, from the Greek ἰατρός (iatros, "healer") and γένεσις (genesis, "origin"); as such, in its earlier forms, it could refer to good or bad effects.

Doctors were among the first to understand the danger of their professional activities for the life and health of people. Already in the IV. BC. E. In the oath of Hippocrates the doctor's promise was kept: "... I will protect the sick from everything harmful and unfit for them." About 2 thousand years ago this became the principle of treatment: "Primum nos noree" (First of all do not harm), "Nihil nosere" (Do not harm at all), which was perceived as the first commandment of a doctor. Later, diseases associated with the provision of medical care, began to be called iatrogenesis - a disease of medical origin.

With the development of scientific medicine in the 20th century, it could be expected that iatrogenic illness or death would be more easily avoided. Antiseptics, anesthesia, antibiotics, better surgical techniques, evidence-based protocols and best practices continue to be developed to decrease iatrogenic side effects and mortality.

Consequences of iatrogenesis.

Numerous literature data indicate that the medical, economic and social consequences of iatrogenesis are manifold and difficult.

Medical consequences are expressed, first of all, in increase of indicators of morbidity, lethality and death rate. Iatrogenic diseases often cause a prolonged loss of health and even disability. Especially it is characteristic for chronic infections, medicinal allergies and postoperative syndromes.

In 1999 the Institute of Medicine (IOM) awakened the nation with their landmark study "To Err is Human," which found that accidental deaths due to medical errors in hospitals account for as few as 44,000 and as many as 98,000 deaths per year in the U.S. Even at the bottom end of the spectrum, these preventable deaths, which include improper transfusions, surgical injuries, and wrong-site surgery, cause more deaths than either breast cancer or motor-vehicle accidents (News Target).

The Journal of the American Medical Association (JAMA) reported that iatrogenic causes of death -- medical errors in hospitals and adverse drug reactions to medications -- total approximately 225,000 deaths annually, making it America`s #3 killer.

A University of Toronto study found that pharmaceuticals kill more people in the U.S. than motor-car accidents (as reported by the Cancer Cure Foundation). Of the two million hospitalized Americans, who suffered a serious adverse drug reaction within the 12 months prior to the study, 100,000 died from their reaction. Of those deaths, 75% were not due to allergic reactions, but were preventable.

Iatrogenic deaths don`t always happen as a result of medical errors or dangerous pharmaceuticals. Physicians sometimes knowingly prescribe highly toxic drugs to people who are critically ill. Equipment failure has also been cited as an unavoidable error in some circumstances.

Classification of iantrogenesis:

Initially, the concept of iatrogenesis was expanded to diseases associated with erroneous actions of the doctor, and then to all diseases and injuries associated with any medical interventions. There are two definitions of iatrogenesis:

1) any new incidental disease (including functional) associated with the actions of medical professionals, whether they were right or wrong;
2) complications of the underlying disease caused by erroneous or inadequate actions of the doctor

Iatrogenesis diseases are all diseases and injuries that occur in patients and health care workers as a result of any type of medical care.

To denote diseases related to the provision of medical care, the following names were also offered: hospitalization , pathology of treatment and diagnosis, adverse (side effects) of diagnosis and treatment.

Iatrogenesis divided into 5 groups:

Psychogenic, Medicinal, Traumatic, Infectious and Mixed

Psychogenic iatrogenesis manifestations in the form of neuroses, psychoses, neurasthenia, hysteria, phobias, depressions, feelings of anxiety, depressive and hypochondria. They are caused by imprudent and misunderstood statements of the medical worker about the patient's health, acquaintance with his own medical history and special medical literature, listening to public lectures, especially on television. They are also called "disease of the word". This group of iatrogenesis also develops in cases of ineffectiveness of treatment, distrust to the doctor, fear of methods of diagnosis, treatment, a sharp transition from an active lifestyle to a passive, from the usual conditions of the family and work collective to a group of people with acute and altered personal perceptions. Joining of iatrogenesis complicates the course of the underlying disease, increases the likelihood of developing new ones, for example, within the hospital, diseases.

Medical iatrogenesis. For medicinal skin rashes was proposed the term "medical diseases". Since the main manifestation of the side effect of drugs is a disease, and the cause of the disease is a medicine prescribed by a doctor, the term "drug disease" can be extended to all clinical forms of diseases associated with the direct or indirect damaging effects of certain components of drugs and impurities to them. Objections to this term are based on understandable, but subjective, moreover, corporate considerations. Most medical diseases are of iatrogenic nature. Only for diseases caused by self-medication and violation of prescriptions of the doctor, there are no grounds for inclusion in iatrogenesis, but, naturally, they enter the group of medical diseases.

Traumatic iatrogenesis . For diseases caused by the action of medical damaging factors of physical and mechanical nature, the term "medical injuries and their consequences" is usually used. In this group, surgical, manipulative and accidental medical injuries, burns (radiation, thermal, chemical) and the consequences of injuries are identified. Particularly serious and numerous are the consequences and complications of surgical and manipulation injuries and burns. To this group of iatrogenes it is possible to attribute conditionally the consequences of excessive intervention, interference without indications (the so-called surgical aggression) and, conversely, the abandonment of the patient without medical care and care of.

Infectious iatrogenia (iatrogenic infections). These include all cases of infectious diseases, the infection of which occurred in the process of providing any type of medical assistance. They are often called ‘nosocomial’ infections, which does not fully reflect the essence of the phenomenon, because, firstly, these diseases also arise when providing medical care in outpatient and also the home care, and secondly, they do not include diseases that are infected outside Hospital. The term "iatrogenesis" directly indicates the relationship of the disease or complications to the provision of medical care, which encourages the doctor to seek ways to prevent such phenomena in his practice. The term "nosocomial" can be preserved for iatrogenic infections that develop in hospitals.

Iatrogenic infections are manifold in their manifestations: bacterial, fungal, viral, protozoal and metazoal; Hospital, clinical etc. They are also shared in the place of localization of the pathological process: infection of the blood; Surgical wound infections; urinary tract infections; Infection of bones and joints; Infections of the cardiovascular system, etc.

Causes of iatrogenesis

The progress of medical science and technology, the expansion and improvement of medical care, the introduction of new highly active drugs and vaccines into medical practice, on the one hand, provided shorter terms and greater completeness of recovery of patients, reduced disability and mortality, and narrowed the range of their distribution. On the other hand, in parallel with this, the degree of danger of medical care, the number of iatrogenic diseases and mortality from them grew. Medicine has come to such a point, when any call to a doctor is not only good, but also a risk of loss of health and even life.

A thorough scientific analysis of the causes of growth and severity of iatrogenic diseases is yet to be carried out. But all the reasons listed in the literature can be combined into four groups.

The first group is the ever increasing frequency of contacts between the population and medical workers, which has a direct correlation with the frequency of development of iatrogenic diseases. A sharp increase in the frequency of contacts is due, first, to the growth of independent appeals of the population for medical care, caused by a more attentive attitude towards their health and the increased opportunities for obtaining it; Secondly, the expansion of the scale of active preventive care for the population; Third, the transition to specialization, hyper-specialization and multistage medical care, as a result of which the patient is currently in contact with dozens of medical personnel in the process of treatment.

The second group of causes of iatrogenic growth is an expansion of the spectrum and an increase in the damaging force of mechanical, physical and biological factors that are used to prevent disease, determine health status and restore it. The doctor sees in these factors only positive value and does not know, forgets or ignores their negative side effect. Any medical factor, regardless of its nature under certain conditions, can become a factor of damage and lead to the development of iatrogenic diseases.

To the third group of risk factors for the development of iatrogenesis, it is legitimate to attribute the sensitization of many modern people to the factors of damage, especially of the mental, chemical and biological (infectious) nature.

The fourth group includes medical factors of a subjective nature, including the weak scientific development of the problem of the safety of medical care, especially the methods of iatrogenic prophylaxis; Inattention to it by health authorities; Low level of pre-diploma and postgraduate training and the degree of competence of medical personnel in safety matters; Ignoring the safety requirements for the construction and operation of medical facilities, the creation and use of medical devices, tools, care items, methods and means of diagnosis, treatment and prevention of diseases; A weak material base of a number of medical institutions; Lack of a system of accounting, reporting, analysis of most forms of iatrogenic diseases; Distrust of a significant part of the population to the activities of health authorities.

These groups of risk factors for the development of iatrogenesis have a definite value for the distribution of all iatrogenic groups, however, each of them has its own specifics.

Prevention of iatrogenesis

Iatrogenic diseases are manifested in neurotic reactions involving various variants of autonomic dysfunction. Depending on the nature of the psychotrauma and personality traits, vegetative disorders can have a generalized character or may be expressed by the predominant cardiovascular dysfunction (cardiac arrhythmia, changes in blood pressure, etc.), digestive (heartburn, vomiting, stool disorder) and other systems in combination with various pathologies. Sensations and depressive state. The main method of treatment of iatrogenesis is psychotherapy, supplemented if necessary by symptomatic treatment - the use of tranquilizers, antidepressants and other psychotropic drugs. It is unacceptable to inform the patient that the disease is absent and should not be treated. Medical workers should remember that iatrogenesis is a disease that requires careful study of the personality of the patient, knowledge of his social environment. Need the help of a psychotherapist or psychiatrist. The iatrogenic prognosis is favorable in most cases, with timely and correct therapy, recovery occurs in a few weeks or months. Later, the recognition of iatrogenic diseases promotes its prolonged course and worsens the prognosis. Prevention begins with the highly moral, humanistic education of physicians in the process of their training and activities, with the profound assimilation by the future medical workers of the principles of honey. Deontology, based on a sensitive attitude, compassion for the patient. Health workers should be aware of the responsibility for "verbal asepsis", the need for constant monitoring of their behavior (intonations, views, gestures), which can be misinterpreted by the patient. Considered should be the content of the sick honey. Documentation. Particular care should be taken when providing medical care to health workers themselves, for whom iatrogenesis is relatively frequent, and their treatment presents difficulties in connection with the often increased resistance to psychotherapy. To prevent Ya. It is necessary to conduct systematic educational work with all personnel communicating with patients. System honey. Education of the population should exclude superficial, amateurish training in self-diagnosis, which promotes the spread of iatrogenic diseases.

Conclusion

The high risk of developing diseases in the process of receiving medical care, the use of psychiatry in pursuit of political opponents, the closed work of medical institutions, the patient's complete dependence on the doctor regarding his health and life, the corporate behavior of many doctors, the multitude of conflict situations between medical workers and patients led to Decrease and even loss of trust in some doctors and medicine in general. Trust in the doctor no longer fully fulfills the role of the moral regulator of the relationship between the doctor and the patient, between the population and health. The second moral regulator - the conscience and duty of a doctor - has, due to a number of circumstances, lowered its threshold and is no longer a sufficiently reliable criterion for the safety of medical care, inability to solve etc.

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Role of Reduced Endothelial Shear Stress in the Development of Atherosclerosis

Marika Gamkrelidze[1], Nodar Sulashvili[2]

The University of Georgia, School of Health Sciences and Public Health
[1]Associate Professor; [2] PhD(c), Head of the Biochemistry and Pharmacology Division

Summary

Atherosclerosis is a chronic, inflammatory, fibroproliferative disease primarily of large- and medium-sized conduit arteries. Although the entire vasculature is exposed to the atherogenic effects of the systemic risk factors, atherosclerotic lesions form at specific regions of the arterial tree, such as in the vicinity of branch points, the outer wall of bifurcations, and the inner wall of curvatures, where disturbed flow with low endothelial shear stress occurs. Vascular endothelial cells (ECs), uniquely situated at the interface between the blood and the vascular wall, are constantly exposed to fluid shear stress. Shear stress is reduced (<5 dynes/cm^2) at the outer walls of a bifurcation, branching, inner curvature walls, and these are the sites susceptible to atherosclerosis, the sites where atherosclerotic plaques are predominantly located. Physiological levels of laminar shear stress modulate cellular signaling and ECs function and are protective against atherogenesis. ECs are effective biological mechanotransducers which convert physical stimuli of shear forces to intracellular biochemical signals that provide normal vascular function and atheroprotection.Low endothelial shear stress attenuates nitric oxide (NO)-dependent atheroprotection; promotes low-density lipoprotein cholesterol (LDL) uptake, synthesis, and permeability; it promotes oxidative stress and inflammation, as well as vascular smooth muscle cell (VSMC) migration, differentiation, and proliferation; it attenuatesdegradation of extracellular matrix (ECM) in vascular wall, and plays potential role in atherosclerotic plaque neovascularization; low endothelial shear stress increases plaque calcification and thrombogenecity. The present article reviews the mechanisms of abovementioned changes in vascular walls caused by low endothelial shear stress.

Abbreviations: *NO- nitric oxide, ROS - reactive oxygen species , Ac-LDL- acylated-low-density lipoproteins , ECM - extracellular matrix , TNF- Cytokine tumor necrosis factor , VCAM- vascular cell adhesion molecule. MCP- monocyte chemoattractant protein*

Key words: *atherosclerosis; endothelial cell; endothelial shear stress; nuclear factor-kappa B; nitric oxide; endothelial nitric oxide synthase*

The build up of atherosclerotic plaques within the arterial tree is the underlying cause of most forms of cardiovascular disease, including coronary artery disease and stroke. Atherosclerosis remains a major cause of morbidity and mortality worldwide, and a thorough understanding of the underlying pathophysiological mechanisms is crucial for the development of new therapeutic strategies.Atherosclerosis is a multifactorial disease involving a complex array of contributing factors.Vascular endothelium has a key role in determining vascular function and is intimately involved in atherosclerosis. It handles important regulatory functions that include regulation of vascular tone, maintenance of the composition of subendothelial matrix, vascular smooth muscle cell proliferation, coagulation, fibrinolysis, permeability of lipoproteins and plasma proteins, and adhesion and migration of blood cells.Endothelial dysfunction (ED), which is characterized by an imbalance between relaxing and contracting factors, procoagulant and anticoagulant substances, and between pro-inflammatory and anti-inflammatory mediators, may play a particularly significant role in the pathogenesis of atherosclerosis[1].

Biological differencesof atherosusceptible endothelium include increased endothelial permeability to plasma macromolecules, increased (but still very low) endothelial proliferation, and increased immuno-surveillance by monocytes that attach and migrate into the artery wall[2]. These site-specific functional differences do not result in progression to significant inflammation unless additional systemic risk factors (e.g. hypercholesterolemia; hypertension; diabetes; smoking stress) are also present. The atherosusceptible phenotypes, therefore, may be considered to be in a sensitized—pre-lesional state[3].

Atherosclerotic lesions are found unevenly distributed in the vasculature. Atherosclerotic plaques develop essentially in arterial branch points, bifurcations and curvatures, regions of arterial narrowing. The carotid bifurcation, coronary arteries, abdominal aorta, and the iliofemoral arteries are lesion prone while other arteries are spared.In the carotid artery, for instance, atherosclerotic plaques tend to develop in the outer wall of the vessel at the level of the bifurcation[4, 5] and in the coronary arteries - in segments with bifurcations, as well as along the inner wall of curves[6,7].

In comparison, straight segments of the arteries remain lesion-free. On the other hand, it is not clear why some plaques remain quiescent for many years, while others progress rapidly. Findings suggest that independently of systemic factors, the presence of local hemodynamic factors such as wall shear stress plays a major role in the generation, progression, and destabilization of atherosclerotic plaques.

The haemodynamic conditions inside blood vessels lead to the development of superficial stresses near the vessel walls, which can be divided into two categories; 1. circumferential stress dueto pulse pressure variation inside the vessel; 2. shear stress generated by the frictional force of flowing viscous blood,and acting tangentially to the cell surface of the endothelium[10].Vascular endothelial cells (ECs), uniquely situated at the interface between the blood and the vascular wall, are constantly exposed to fluid shear stress [11].Cell deformation in response to applied shear stress is expressed as strain and depends on the mechanical and structural properties of the cell. Endothelial cells are capable of altering their structure and mechanical properties resulting in the generation of intracellular stress, e.g., cytoskeletal reorganization in response to flow. Tension developed by the cytoskeleton is related to altered cellular metabolism of living endothelial cells and expression of differentiated properties of the endothelium[12].

Relatively long, straight, unbranched arteries provide favorable conditions for laminar flow, which has radially symmetric parabolic velocity profile regardless of the vessel radius, and experience relatively high shear stress (15 dynes/cm^2).Near arterial branches and curves, velocity profile of blood flow acquires asymmetric character and then becomes disturbed (turbulent) for certain segment of the vessel until the symmetric velocity profile is developed again. At that, shear stress is reduced (<5 dynes/cm^2) at the outer walls of a bifurcation, branching, inner curvature walls, and these are the sites susceptible to atherosclerosis, the sites where atherosclerotic plaques are usually located. A typical laminar flow area is located in the greater curvature area and is marked as a low probability region for lesion formation, which is also known as a high wall shear stress area. A disturbed flow area is the lesser curvature area where lesion formation is more prevalent[13] and is also indicated as a low wall shear stress area.

Physiological levels of laminar shear stress modulate cellular signaling and ECs function and are protective against atherogenesis. ECs are effective biological mechanotransducers which convertphysical stimuli of shear forces to intracellular biochemical signals. As the vascular interface with flow-mediated shear stresses, the arterial endothelium senses changes in local haemodynamic characteristics and responds by initiating acute changes in artery wall vasomotion and chronic structural remodeling [14].Regulatory *physiological* responses to endothelial shear stress ensure adjustments of the vascular system and facilitates development and growth. However, localized regions of highly disturbed arterial flow areassociated with metabolic stress in the endothelium that sensitizes the cells to local inflammatory changes that favour a *pathological* outcome, the initiation and development of atherosclerosis.

Mechanotransduction involves transmission of the stress throughout the cell via the cytoskeleton (refer to Fig. 3). Here the membrane molecules participate in two ways: *1*) to passively transfer the stress to the cytoskeleton in one part of the cell and *2*) to respond to cytoskeletal deformations at sites remote from the stimulus (Flow mediated mechanotransduction). This involves activation of intracellular signaling pathways through the mechanosensitive ion channels, in particular, shear stress-activated potassium channels in endothelial cells first identified by Olesen et al.[15].Activation of the channels results in hyperpolarization of the endothelial cells. A mechanosensory complex on the endothelial cell surface has been identified as an initial transducer of mechanical forces consisting of the adhesion molecules PECAM-1 (platelet endothelial cell adhesion molecule-1), which is the mechanosensor, and VE-cadherin and VEGFR-2 (vascular endothelial growth factor receptor-2), which, once activated, stimulate a host of downstream signaling pathways. Mechanotransduction via this trimolecular complex mediates integrin activation, which causes elongation and alignment of ECs in the direction of flow, characteristic of cells in high-shear, protected regions[16]. This is an adaptive response that redistributes and reduces the local mechanical load experienced by the cell, reducing subsequent injury, and is dependent on anchoring of endothelial cells to the extracellular matrix via integrins. High laminar shear stress induces rapid conformational activation of integrins leading to remodeling of endothelial attachment sites and increased binding to the extracellular matrix, triggering cytoskeletal rearrangement and cell alignment[17].In contrast, blood flow within vessel curvatures, branch points, and bifurcations is typically disturbed, with overall low shear stress. As a result, ECs do not align parallel to the vessel long axis and show a less polarized shape, so-called cobblestone morphology. Because the cells do not align with the general direction of flow, their topology exposes them to greater shear stress gradients across the length of the cell, and these areas are also more prone to atherosclerosis[18] , Within the carotid bifurcation, where atherosclerosis often develops, the flow separates, disrupting the laminar profile and producing disturbed streamlines[19].Intracellular calcium is also an important signaling molecule that mediates critical intracellular pathways after stimulation of endothelial cells by a variety of agonists[20].

An important rapid physiological consequence of hemodynamic force transduction is the acute regulation of arterial diameter. When flow increases, arteries dilate by endothelial-dependent nervous system-independent relaxation of smooth muscle cells. There is now good evidence that the mechanism involves the enhanced release of endothelial-derived relaxing factors (EDRF).In regions spared of atherosclerosis, the blood surges during the cardiac cycle at an increasing then decreasing velocity as the contraction decreases resulting in unsteady but unidirectional laminar flow that is atheroprotective. In contrast, atherosclerosis develops in spatially predictable regions within large elastic and muscular distributing arteries near branches and bifurcations—where changes of vessel cross-sectional area occur over short distances—or as blood flow attempts to follow the tight inner curvature of the aortic arch.

The principal component of EDRF is nitric oxide (NO) [21].Endothelial nitric oxide (NO) synthase (eNOS) is a key mediator of abovementioned atheroprotective effects.NO is an endogenous activator of the soluble form of guanylate cyclase.Endothelial cells in vitro respond to shear stress by stimulation of cGMP, the elevation of which is proportional to the intensity of the shear stress up to ~40 dyn/cm^2. The increase appears to be regulated by a flow-induced activation of soluble guanylate cyclase which, in turn, is mediated by autocrine production of NO. NO reduces endothelial permeability, inhibits platelet adhesion and aggregation, reduces leukocyte adherence, LDL uptake, inhibits vascular smooth muscle cell proliferation, while simultaneously promoting EC survival[22].eNOS is constitutively expressed at a basal level, and its activity is calcium/calmodulin dependent. The activation of eNOS by flow involves increase of Ca^{2+} and calmodulin binding. However, the mechanisms of shear stress transduction are unclear because of the large number of regulatory possibilities associated with the cofactors for activation of this enzyme. Steady laminar flow induces synthesis of NO that is dependent on shear stress magnitude in the range of 2–12 dyn/cm^2 and upregulates the level of eNOS mRNA. Physiologic pulsatile endothelial shear stress constitutes the most potent stimulus for continuous NO production by the endothelium, an effect that is regulated at either transcriptional level through upregulation of eNOS gene expression or at post-transcriptional level by eNOS protein phosphorylation and activation[23].In contrast, disturbed turbulent flow fails to upregulate eNOS mRNA, and NO release remains at basal levels[24].In arterial regions with disturbed flow, low endothelial shear stress reduces the bioavailability of NO by decreasing eNOS messenger ribonucleic acid (mRNA) and protein expression, thereby exposing the endothelium to the atherogenic effect of local and systemic risk factors.

Prostaglandin I_2, also known as prostacyclin, is another endothelial vasodilatory substanceand the most potent natural inhibitor of platelet aggregation. Its synthesis and release from endothelial cells occur not only in response to a number of agonists, but also in the presence of increased shear stress.Low endothelial shear stress downregulates prostacyclin, while upregulating endothelin-1 (ET-1)[25], a potent vasoconstrictive and mitogenic molecule, thereby precipitating atherosclerosis.

Low ESS increases plaque thrombogenecity by downregulating the expression of eNOS and prostacyclin, well known for their anti-thrombotic properties.

Normal shear stress promotes anti-oxidative and anti-inflammatory processes. Various studies have shown that the presence of a normal or increased wall shear stress (≥10 -15 dynes/cm²) has a protective effect on the endothelium mediated by inhibition of endothelial proliferation, a local anti-inflammatory effect, prevention of apoptosis of endothelial cells, and increased expression and activity of antioxidant enzymes (superoxide dismutase and nitric oxide synthase) in endothelial cells[26].

Cytokine tumor necrosis factor-(TNF-) is an important mediator of the inflammatory processes that occur during the progression of atherosclerosis[27]. Produced by macrophages that infiltrate the lesion,cytokines such as TNF- are known to induce the expression of many endothelial genes that contribute to the complex processes involved in atherogenesis.Well known examples include the transcriptional regulation of various adhesion molecules, such as intercellular adhesion molecule-1 (ICAM-vascular cell adhesion molecule-1 (VCAM-1), and E-selectin[28].Studies of cultured endothelial cells have revealed that prolonged unidirectional high shear stress suppresses pro-inflammatory activation and leukocyte recruitment in response to such inflammatory stimulus as tumor necrosis factor-alpha (TNF-α) [29].This observation is supported by in vivo studies where endothelial cells at low shear, atherosusceptible sites express pro-inflammatory markers. In contrast, pro-inflammatory signaling is suppressed in regions of the arterial tree that are protected from atherosclerosis and exposed to high shear stress[30, 31].

Atherogenesis is promoted by decreased shear stress because it is associated with reduction in several vascular wall functions including eNOS production, vasodilatation and endothelial cell repair. These are coupled with increases in reactive oxygen species (ROS), endothelial permeability to lipoproteins, leukocyte adhesion, apoptosis, smooth muscle cell proliferation and collagen deposition[32].Observations suggest that shear stress acts through the endothelium to modulate smooth muscle cell gene expression providing an atheroprotective phenotype to the vessel wall. The uptake of acylated-low-density lipoproteins (Ac-LDL) is decreased in endothelial- smooth muscle cell cocultures exposed to laminar shear stress relative to static cultures[33].

The level of shear stress is inversely correlated with smooth muscle cell(SMC) density, whereas exposure to laminar flow does not influence cell density[34].These studies suggests that shear stress acts on vascular SMC in part through endothelial interactions to modulate SMC gene expression, uptake of atherogenic lipoproteins and proliferation as a means of suppressing atheroma formation.

Mechanisms by which high shear stress reduces pro-inflammatory signaling presumably involves two key pro-inflammatory signaling pathways: the mitogen-activated protein kinase (MAPK) pathway and nuclear factor-kappa-B (NF-κB) pathway[35]. The MAPKs are a group of serine/threonine protein kinases that play an important role in many cellular processes including apoptosis, proliferation, and inflammation. The transcription factor NF-κB has been closely linked with cardiovascular health and disease due to its control of multiple processes including immunity, inflammation, cell survival, differentiation and proliferation, and regulation of cellular responses to stress, hypoxia, stretch, and ischemia. NF-κB signaling in endothelial cells typically leads to the expression of genes that induce recruitment of inflammatory cells to the vessel wall, including ICAM-1 (intercellular adhesion molecule-1), VCAM-1, E-selectin, and cytokines such as TNF-α and IL-1[36].Studies in mice and pigs revealed that the expression of NF-κB subunits is significantly increased in regions of the aorta exposed to low shear stress compared to high shear stress[37]. Cells exposed to low shear stress are primed for activation by a pro-inflammatory stimulus due to an increased expression of NF-κB subunits[38].Low shear stressinduced NF-κB activation upregulateschemoattractant chemokines, such as monocyte chemoattractant protein (MCP)-1; and pro-inflammatory cytokines, such as tumor necrosis factor (TNF)-α, interleukin (IL)-1, and interferon(IFN)-γ[39]. Presumably high laminar shear stress suppresses inflammation in part by modulating or inhibiting NF-κB and MAPK signaling.

Low endothelial shear stress promotes oxidative stress. Low endothelial shear stress promotes production of reactive oxygen species (ROS) into the intima and, eventually, oxidation of low density lipoproteins (LDL), by enhancing gene expression and post-transcriptional activity of the major oxidative enzymes (nicotinamide adenine dinucleotide phosphate [NADPH] oxidase and xanthine oxidase) at EC membranes. Low shear stress appears also to downregulate the intracellular ROS scavengers, such as manganese superoxide dismutase and glutathione, further augmenting local oxidative stress. Generated ROS degrade NO and its co-factors, reducing the bioavailability of atheroprotective NO and further enhancing the production of ROS (e.g., superoxide [O_2^-] or peroxynitrite [$ONOO^-$])[40]. Overproduction of ROSis an integral part of the development of atherosclerosis. Oxidative stress participates in pro-atherogenic mechanisms of endothelial dysfunction[41].

Neovascularization (angiogenesis) constitutes a key factor in the progression and vulnerability of atherosclerotic plaques by supplying them with lipoproteins, inflammatory cells, matrix proteases, and ROS (99). Low endothelial shear stress indirectly promotes intimal neovascularization by inducing intimal thickening and thus ischemia, upregulating the expression of VEGF and other angiogenic factors (e.g., angiopoietin-2), enhancing local inflammation, oxidative stress, and expression of matrix degrading enzymes and accentuating EC and VSMC migration and proliferation[42].

Low and disturbed flow causes intensive degradation of extracellular matrix (ECM) of ECs and attenuates ECM synthesis. Interferon-γ, a pro-inflammatory cytokine derived by the activated T-lymphocytes in response to low endothelial shear stress, constitutes a potent inhibitor of collagen synthesis by VSMCs and simultaneously promotes Fas-related VSMC apoptosis[43]. Vascular smooth muscle cell apoptosis can be also induced by low shear-generated oxidative stress through activation of Fas signaling pathways [44]. Next to its role in VSMC turnover, NO constitutes potent inducer of collagen synthesis by VSMCs as well as anti-inflammatory molecules. Downregulated endothelial expression of eNOS genes due to low endothelial shear stress might contribute to increased inflammation and reduced matrix synthesis.

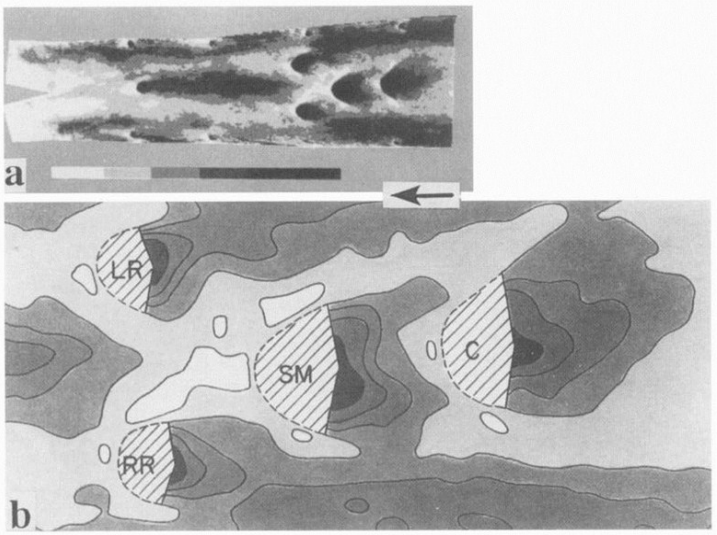

Fig. 1 Localization of human atherosclerosis in abdominal aorta. *a*: it demonstrates lesions associated with regions of predicted complex hemodynamic profiles near branch arteries. *b*: detail of *a* showing distribution near right and left renal arteries (RR, LR) as well as superior mesenteric (SM) and celiac branches (C). Arrow indicates overall direction of flow.

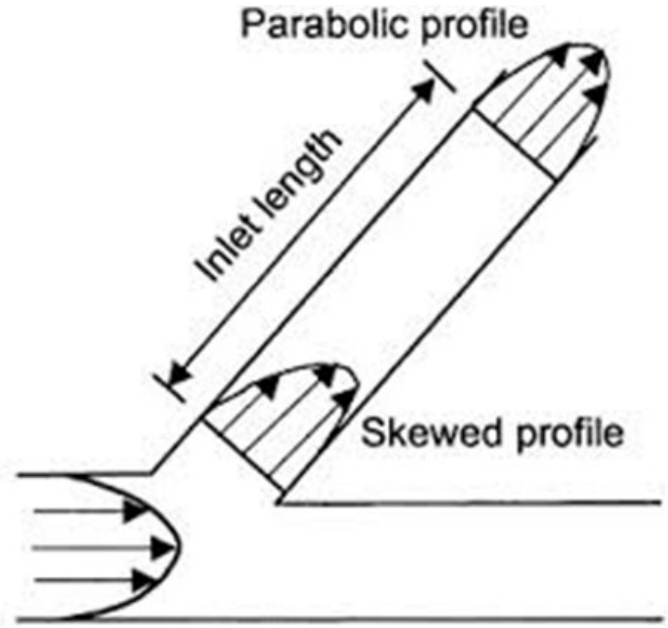

Fig. 2. Flow entering a side branch results in skewed profile; it takes a certain entrance length before the parabolic velocity profile is developed again.

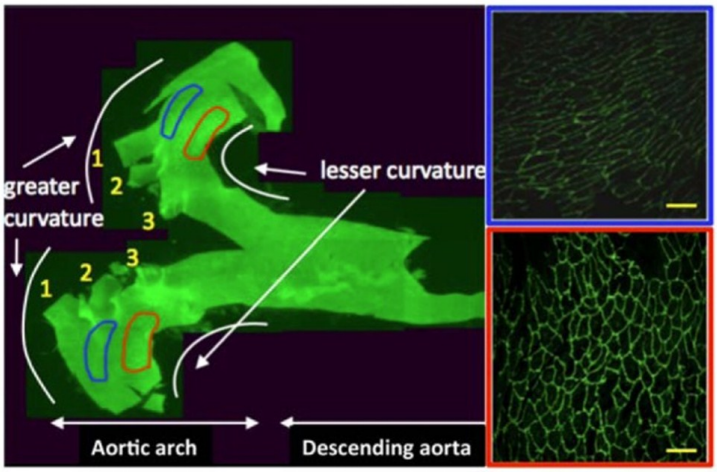

Fig. 3.En Face immunohistochemistry. The greater curvature of the aortic arch is exposed to steady laminar flow and is protected from atherosclerosis. Regions of smaller curvature and side branches indicated by numbers (1, 2, and 3) are exposed to disturbed flow and are athero-prone areas. The aorta was prepared from a 7 weeks old C57BL/6 wild type mouse.

Conclusion:

Local hemodynamic factors influence the evolution of atherosclerotic disease and may contribute to explaining the differences in distribution and progression of different atherosclerotic plaques. The presence of a low wall shear stress favors progression of the plaque, while a physiologic shear stress has a protective effect in the vascular endothelium. In the atheroprone regions, the endothelium has a pro-inflammatory phenotype associated with low nitric oxide production, reduced barrier function and increased proadhesive, pro-coagulant and proproliferative properties. Athero-resistant regions are exposed to laminar flow and high shear stress that induce pro-survival antioxidant signals and maintain the quiescent phenotype in ECs. Indeed, various flow patterns contribute to phenotypic and functional heterogeneity of arterial endothelium whose response to pro-atherogenic stimuli is differentiated. This may explain the preferential development of endothelial dysfunction in arterial sites with disturbed flow.

Thus low shear stress provides predisposition for atherogenic transformation by contributing to endothelial dysfunction whereas high shear areas might shield against atherosclerosis by enhancing endothelial protection. Shear stress of laminar blood flow is a critical factor in maintaining normal physiologic vascular function including thromboresistance, barrier function and vascular homeostasis.

Further studies are to be conducted to shed light on the mechanisms by which shear stress modulates endothelial apoptosis, proliferation, and thrombogenicity, all of which contribute to the pathogenesis of atherosclerosis. Better understanding of these mechanisms will enable targeted therapeutic interventions that promote a protective phenotype in atherosusceptible regions in order to slow or even halt the progression of cardiovascular disease.

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Impact of Modern Information Technologies on Healthcare Seeking Behavior (Literature Review)

Simon Gabritchidze

The University of Georgia, School of Health Sciences and Public Health[1], Welfare Foundation[2]
[1]MD, MS, MA, PhD (c) , [2]Executive Director

Summary

There is growing interest worldwide to study various factors that influence on patients (health care consumers) behavior while seeking health care. Findings from these studies may be successfully utilized for future planning of health care system to make it more consumer-centered, comprehensive and responsive. In parallel to traditional health seeking, during the recent decades more and more consumers apply to modern information technologies to obtain healthcare information. In many developed countries, patients and their family members intensively utilize internet in seeking health care providers. Recently, specially developed web-sites and mobile phone applications give health care consumers great chances to search and select desired providers. Information and communication technologies (ICTs) may positively influence on health seeking behavior in developing countries as well. There has been extensive international discussion about the increasing potential of ICTs to make considerable impact in improving health and well-being of poor and marginalized population, alleviate poverty, and increase efficiency and effectiveness of health care system. During the last decade, the Government of Georgia (GoG) has privatized almost all health care facilities as trying to implement radical neo-liberal reforms in all sectors of economy including health and social welfare. Expanding role of the private sector has been accompanied by considerable reduction of the state regulating functions. As a result, Georgian patients have very limited access to information on quality and safety of health care services offered by various providers. Few papers studied health care seeking behavior in Georgia with particular focus on barriers to health care utilization. So far, no study exists that have analyzed the impact of modern information technologies on health seeking behavior of the patients in Georgia. This is considerable challenge, particularly taking consideration significant speed of contemporary informational technologies development.

Abbreviations: *ICTs- Information and communication technologies, GoG- Government of Georgia, WHO- World Health Organization.*

Key words: *health care seeking, determinants of health seeking, impact of information technology, health systems and policy, Georgia.*

Introduction

This paper is based on a literature review on health care seeking behavior, social/economic/cultural determinants of health seeking and its implications on health policy and system development, impact of modern information technology on health care consumer's (patient's) decision. A search of peer-reviewed, indexed paper was done using PubMed, Science Direct, HINARY Library and Google Schoolars. A combination of the keywords was used: health care seeking, social/economic/cultural determinants of health seeking, impact of information technology, health systems, health policy, developing countries and Georgia. Further to this, a report of World Health Organization was consulted for providing further evidence on challenges and future prospects of using electronic processes and communication in health care practices and their relation to policy. Moreover, some World Bank's working and policy papers on the related topics were also reviewed and discussed.

Patient (health care consumer) health seeking behavior – theoretical frameworks

There is growing interest worldwide to study various factors that influence on patients behavior while seeking health care. Findings from these studies may be successfully utilized for future planning of different levels of health care system to make them more consumer-centered and responsive. According to Tipping and Segall, two broad categories can be identified in health seeking behavior studies: there are studies which make focus on the 'end point' (utilization of the formal system, or *health care seeking behavior*); secondly, there are those which emphasize the 'process' (illness response, or *health seeking behavior*) (Tipping & Segall, 1995).

The studies that focus on utilization of formal system reveals that particular decision influenced by a variety of socio-economic variables, sex, age, the social status of women, the type of illness, access to services and perceived quality of the service (Tipping and Segall, 1995). In mapping out the factors behind such patterns, there are two broad trends. Firstly there are studies which categorize the types of barriers or determinants which lie between patients and services. In this approach, there are as many classifications in terminology as there are studies, but they tend to fall under the divisions of geographical, social, economic, cultural and organizational factors.

Decision-making in the household is a critical element in the status of its members since it involves the allocation of resources and the distribution of roles within the household. Decision-making among other things affects general health care and treatment seeking in particular. Studies revealed that women often follow quite diverse pathways for different illness episodes, predominantly depending on the role of their husbands, social networks and cultural norms (Ahmed et al. 2000). Number of studies indicated that gender plays role in making decision about selecting provider. For example, Yamasaki-Nakagawa et al (2001) found women in Nepal were more likely than men to seek initial help from traditional healers. Rahman (2000) in rural Bangladesh found that 86% of women received health care from non-qualified health care providers. All these factors have further implications for the period of diagnosis. The studies found that women had significantly longer delays in diagnosis than men (Needham et al, 2001; Yamasaki-Nakagawa et al, 2001).

Local knowledge should be carefully considered in order to understand health care seeking behavior in many developing, resource-poor countries. Poverty is one of the main determinants of health care seeking. In the World Bank Research Working Paper, Das et al. (2011) demonstrated great impact of the household income on health seeking behavior in India. The authors concluded that often poor do not perceive illness as "extraordinary event" but usual part of their "normal life". A poorer person does not complaint on chronic illness unless there has been an acute episode of the sickness (Das et al 2011). This is coupled with the fact that people (especially in resource poor settings) often apply to non-formally trained local healers and do not seek care from Western practitioners. There are abundant evidence of this type of behavior and its profound effect on health. For example, in Bangladesh there is a large and growing sector of non-qualified allopathic providers engaged in the distribution of modern pharmaceuticals. They provide an accessible means of reaching Western medicines to a wider range of the population, yet lack formal medical training. There is therefore the associated problem of bad, unregulated prescriptive practices. Incorporating these unqualified providers into more formal training may therefore be beneficial for the whole society (Ahmed et al. 2000). Uzma et al (1999) also suggested involving unqualified traditional healers into training programs for reproductive and maternal health in order to improve the health status of women. Thus increasingly health care seeking behavior studies are drawing to the conclusion that traditional and unqualified practitioners need to be recognized as 'the main providers of care' (Rahman, 2000) in relation to various health problems in many developing countries. Some authors however, concede that only incorporation of traditional healers in formal trainings has little effect in terms of changing practice. For this purpose, managerial and regulatory interventions are additionally needed in order to reduce health inequality and promote adequate health care seeking behavior (Ahmed et al. 2000).

Privatization of health care facilities is widespread trend in many developed and developing countries during the recent decades. As a result, public and private facilities simultaneously exist in many settings. Additionally, great number of private sector providers runs their own clinic on a for-profit basis while also working within a not-for-profit organization or in the public sector. Some authors have suggested the need to improve integration of private sector providers with public care (Needham et al. 2001). WHO encourages active work with private sector providers for better health outcomes and even promotes special guide for increasing coverage, improving quality of care and controlling the excessive health care cost (Smith et al. 2001). It is interesting to learn more about health care seeking behavior and preferences made between public and private providers. According to various studies this depends on the type of provided services: although the number of private health care providers has increased substantially due to neo-liberal reforms, the bulk of inpatient services in developing countries are mainly provided by the public sector (Jowett et al. 2004). More important factor in health care decision-making process is availability of health insurance. Beoge et. al. (2014) indicated that having insurance was the strongest predictor for seeking treatment from private-for-profit providers among urban adults in Burkina Faso. As Jowett et al. (2004) found out insurance has particular strong influence on health care-seeking among poorer individuals. At higher income levels, the study found no significant difference in health care seeking behavior of insured and uninsured individuals (Jowett et al. 2004).

Majority of studies on health care seeking behavior mainly focus on the end point – utilization (among them are all studies conducted in Georgia, which I review below). There is necessity to look health care behavior more generally and address the multifaceted nature of the process involved. The studies suggest that the process of health care seeking may be quite versatile and not correspond to the preferred end points of service providers. The health issues are complex and necessitate systematic knowledge that goes well beyond the health sector to address them. Substantial body of work, rooted especially in psychology, looks at health seeking behavior more generally; drawing out the factors which enable or prevent people from making 'healthy choices', in either their lifestyle behavior or their use of medical care and treatment (MacKian, 2003).

Number of 'social cognition models' have been developed in order to explain perceived ill health and corresponding behaviour patterns. These models are based on a combination of demographic, social, emotional and cognitive factors, perceived symptoms, access to care and personality. The underlying assumption is that behavior is best understood in terms of an individual's perception of their social environment (Conner and Norman, 1996).

The creation of this knowledge involves a number of social science disciplines working together with the medical professions. Sheeran and Abraham (1996) classify the range of behavior that have been examined using health belief models into three broad areas: preventive health behaviors, sick role behaviors and clinic use. In this type of model, individual beliefs offer the link between socialization and behaviors. Health belief model consists of two components: 'threat perception' and 'behavior evaluation'. Threat perception is related to a particular person's attitude to illness and expected disease severity. Behavior evaluation links to certain beliefs regarding benefits of particular behavior and the barriers to it. This model was criticized mainly for representing individuals as asocial economic decision-makers (Sheeran and Abraham, 1996).

Another type of 'social cognition model' is linked to the general assumption that those persons who believe they have control over their health are more likely to engage in health promoting behavior (Normand and Bennett, 1996). This approach is in line with main assumption of neoclassical economics which postulates that individuals are rational decision-makers as they systematically assess available information and shape their behavior based on it. It is assumed that individuals better know what the best options for them are. This assumption is true even in the cases when people clearly exhibit risky behavior (e.g. drug abuse). Of course, neoclassical economists admit that access to complete information is necessary in order to make a rational decision which is seldom available in the reality. The main issue is that these models focus *on the individual* and the centrality of *cognitive processes* ('I know, therefore I act'). According to MacKian "this loses the sense that we are all rooted in social contexts that affect, in a far more complex manner, the way we process and act on information" (MacKian, 2003). In this context, the studies of MacPhail and Campbell (2001) should to be noted as they tried to explore the neglected societal, normative and cultural contexts in which individual-level phenomena such as knowledge, attitudes and behavior are negotiated or constructed. They strongly emphasized the necessity of having better research in developing countries in order to understand "social rootedness" of health seeking behavior. Lash (2000) suggests that in order to understand the complexities of how people explore their relationship to particular decisions or actions, how and why they weigh up options as they do, we might think of '*reflexive communities'*. "Reflexive communities reflect the particular ways of behaving, thinking and reaching decisions of individuals or groups that in turn reflect the social construction of their position in wider society at a particular place and time. Acts within these reflexive communities do not rely solely on the processing of information and knowledge. They reflect something far more complex, emotional, social and practical" (Lash, 2000). In order to better understand how people make decisions about health seeking behavior, one needs to analyze not only the information sources and how they are interpreted, but also the underlying, unspoken, unconscious feelings and assumptions which support that cognitive process and the journey taken during it. This reflects findings of some previous studies on health seeking behaviours that stress equal importance of both rational cognitive processes and less easily identifiable affective-emotional processes in making decision on health care seeking. Thus, the way people *perceive* risks and *experience* risk should be a matter for public policy (MacKian, 1996). The relatively new field of behavioral economics presents useful insight in understanding behavior of health consumers. The founder of the behavior economics is Daniel Kahneman who shared Nobel Prize in economics in 2002 with Vernon Smith, for work in this area. Their approach differs from neo-classical economic theory. Instead of assuming that behavior is always rational, behavioral economist proved that individuals sometimes behave in seemingly irrational, but still often predictable ways. Behavior economists incorporated elements of psychology as well as economics in analyzing issues and formulating solutions.

Number of researchers employed theoretical framework provided by Andersen and Newman. Their model is particularly suitable for analyzing health seeking behavior in developed world. Initially, Andersen and Newman developed theoretical framework in order to understand societal and individual determinants of health care utilization in the United States of America (USA). The authors underlined lack of understanding of societal factors in health service utilization. Greater part of empirical studies and theories pay much attention to individual characteristics. Thus, Andersen & Newman's framework consists of societal and individual determinants. Specifically, the main societal determinants of health services utilization represent technology and norms. Technology can be defined as "a set of principles and techniques useful to bring about change toward desired ends" (Taylor, 1971). Norms "correspond to Wilbert Moore's description of social control as representing the spectrum of modes whereby social systems induce or insure normal compliance on the part of members" (Moore, 1969: 300). On the other hand, individual characteristics of health care use includes: (1) the predisposition of the individual to use services; (2) factors that enables or hinders use; (3) individuals illness level and need for care (Andersen & Newman, 2005).

Modern Information technologies and health seeking behavior

In parallel to traditional pathways, during the recent decades more and more consumers apply to modern information technologies to obtain health or healthcare information. In many developed countries, patients and their family members intensively utilize internet in seeking health care providers. Specially developed web-sites and mobile phone applications give health care consumers great chances to search and select desired providers.

Information and communication technologies (ICTs) may improve health seeking behavior in developing countries as well. There has been extensive international discussion about the increasing potential of ICTs to make considerable impact in improving health and well-being of poor and marginalized population, alleviate poverty, and increase efficiency and effectiveness of health care system (Chetley & McNamara, 2006). Similarly, World Health Organization (WHO) highlights importance of ICTs in attainment of desired outcomes across the entire health system and meeting of Millennium Development Goals (MDGs) (Dzenowagis, 1996). ICTs include traditional media sources (radio and television) and fixed telephones as well as modern technologies (smart phones and the Internet). Recent developments of internet and various smart phone applications have made particular impact on health care seeking behavior. This conclusion is made by many authors across the globe. As Ybarra and Suman highlighted, "health-related websites have a powerful effects on the attitudes and behavior of people" (Ybarra & Suman, 2006).

C. Marton and C. W. Choo reviewed theoretical models of health information seeking on the web. Their purpose was to provide an informal assessment of the theoretical foundations and research methods that have been used to study this type of information behavior. Marton and Choo specifically selected four theoretically grounded qualitative studies that explained health information seeking on the web. The reviewed studies clearly indicated the need for multidisciplinary frameworks that can capture the complexity of online health information behavior. The first selected study found that middle age women played key roles in health information seeking on the web. The findings were explained by two models: (1) the theory of planned behavior from social psychology (Ajzen, 1985, 1991); and (2) the uses and gratifications approach from mass communication research (Palmgreen and Rayburn, 1982; Palmgreen, 1984; Palmgreen et al., 1985; Rubin, 1994; Rayburn, 1996; Ruggiero, 2000). The other studies conducted in Hong Kong, South Korea and USA combined elements from theories of human behavior in social psychology, communication research, health behavior, and information science. In particular, there was significant use of the theory of planned behavior, the technology acceptance model, uses and gratifications approach, health belief model, and information seeking models. The results clearly demonstrated that an integration of theoretical perspectives from the health sciences, social psychology, communication research, and information science, is required to fully understand health seeking behavior in the internet. The authors concluded that conceptual models and analytical methods explaining the study results are feasible and promising for future research (Marton & Choo, 2012).

Before exploring eHealth issues in more details, it is important to define who health (or health care) information consumer is – is it patient only, or someone else? First of all, under the term a patient or his/her relatives and friends are considered. But, except the patient, health information seeker may be any person interested in health and healthcare issues. There exists bulk of literature on the informational needs of healthcare professionals. Contrary, there is little information on needs of patients and community members. According to Scott and Thompson, e-Health planning is based on the providers' conception on patients' needs, instead of real evaluation of consumers' demand (Scott and Thompson, 2003). The Researchers also admit that more scientific studies have to be focused on caregivers, family members and other interested persons' health information needs (Scriven and Chesterton, 1994). Available studies are mainly focused on the information related to specific diseases or conditions, definite groups of people or stages of diseases and treatment methods. Usually this kind of studies does not consider "non-patients" informational needs. For example, great numbers of patient oriented studies have been conducted on oncologic patients' information needs (Mosman et al. 1999).

The studies demonstrate that profiles of health information seekers on the web are different based on various factors. The following factors are particularly important to emphasize:

- ◊ Gender
- ◊ Age
- ◊ Education
- ◊ Income
- ◊ Health status

In general, the first important barrier in utilization of e-health resources is related to consumers' accessibility to the internet. According to the Pew project, 27% of adult had no access to internet in USA and most of the Americans used low-frequency network (Fox, 2006). According to the similar study, the following groups of people used the internet particularly seldom:

- ◊ Poor/low income individuals
- ◊ People with primary or secondary education
- ◊ Elderly people, 65 year-old and more
- ◊ Persons with disabilities
- ◊ Ethnic minorities and
- ◊ Civilians for whom English was not native language.

However, the recent studies demonstrate that internet is becoming more acceptable for different group of people and inequality between them is less noticeable. A more fundamental problem detected lately is consumers' education on health related issues. Based on these findings, consumers' low awareness on the health issues is the most important barrier in the decision making process through the internet (Institute of Medicine of the National Academies, 2004).

It is recommended to consider consumers' health education in connection with competencies useful for seeking and processing the information through the internet. The conceptual models consider different but somehow similar instrumental abilities as well (Kaufman et al. 2002; Baker, 2006). These include:

- ◊ common educational abilities (reading, speaking and writing)
- ◊ Mathematical competencies (evaluation, calculation, probability perception)
- ◊ Conceptual knowledge
- ◊ knowledge of health vocabulary
- ◊ Document understanding (comprehension in specific health forms and functions)
- ◊ Technological knowledge (informational technologies management skills) and
- ◊ Seeking information and rhetorical competencies (advocacy, statements making and complaints).

Using health related information is connected to person's cognitive ability, her/his health/physiologic status, attitude to the media and influences of social and cultural norms as well. For example, about 50% of Americans do not possess adequate health communication and management skills (Zarcaduulas et al. 2006; Nielsen-Bolman et al 2004). Like internet accessibility, understanding ability of health related issues is low among people with low-economic status, elderly people and ethnic minorities too (Baker et al. 2002; Schillinger et al. 2002). Problems of health information perception often are connected to person's common cognitive abilities. For example, 43% of USA population is unable to make two different concluding statements from moderate complicated prosaic work (USA National Center for Education Statistics, 2003). Various studies demonstrate that women are particularly interested in searching health/ healthcare issues on the web (Andreasen et al. 2007; Atkinson et al 2009; Gallagher et al. 2008; Fox and Jones 2009). Similar findings are logical as women utilize healthcare services more often than men. In some cases, women visits to internet or healthcare centers are related to family member's health issues (e.g. child illness). In such cases, women are more actively involved in care of family members and seek adequate health services for them. Generally, number of studies highlights importance of women awareness on diseases prevention and healthy lifestyle issues, not only for women but also for their families and whole society (Jashi, 2011).

Besides gender, the consumer's income and education status has also the huge impact on health information seeking process through the internet. Consumers with high education level and income status utilize internet resources more intensively and have accessibility to "fast internet" as well (Kumerfold et al. 2008; Wangberg et al. 2008). In this regard, smart phones may have potential to promote equity in access to digital health information. Kim and Zhang (2015) studied how low-income Hispanics used their smart phone in obtaining health information. The study revealed that low-income users mainly relied on public Wi-Fi to access to the internet. They searched a wide range of health topics - mostly using the mobile web to get information. However, low-income Hispanics did not possess adequate knowledge and skills for using mobile applications effectively as well as for evaluating the quality of health information and following to it. The author concluded that only access to smart phones does not promote to bridge the digital gap for low-income Hispanics. Further actions are necessary to improve the users' smart phone and health literacy as well as to ensure their access to Wi-Fi networks and more quality content in their mother tongue (Spanish) (Kim and Zhang, 2015).

Using the internet and seeking health information is closely related to consumer's age, lifestyle and health risks, which increase with age. Deloitte study has clearly demonstrated differences among various age groups of internet users. According to this study, every 1 in 3 respondents born between 1982-1994 demonstrated interest in internet health information seeking, contrary to every 1 in 5 respondents born until 1945. They preferred to receive information through the telephone or post (Deloitte Center for Health Solutions, 2012). Adolescents (13-19 years old) mainly utilize the internet to find information about their own health related problems, young (20-30 years old) and middle-aged people (30-45 years old) search health information in the internet for their partners. Andreasen et al. argue that European health information seekers are especially active between 30-45 ages (Andearsen et al. 2007). According to Pew researches, American consumers actively seek health information for others, rather than for their own personal reasons (Pew Research Center, 2014). Studies demonstrated that patients feel more self-confident when they find health information through the internet (Hu & Sundar, 2010). Consumer's health status plays an important role in health information seeking behavior. Studies demonstrated that those patients who are under higher risk of death often apply to the internet search for getting health related information. For example, according to Kalichman et al., in the USA, two-thirds of 347 men and 72 women with HIV/ AIDS infection devoted more than half of the total time spent in internet seeking health-related information (Kalichman et al. 2006). World Health Organization (WHO) has been conducted several eHealth Surveys since 2005. In the survey of 2015 WHO focused attention to eHealth importance in universal accessibility of healthcare services. eHealth "increases possibilities, transparency and accessibility to medical services and health information" (WHO, 2016). The report outlines e-technologies positive impact on consumers' abilities to evaluate existing health services and make informed decision while seeking affordable providers. In the previous report of the similar study conducted in 2008 is highlighted that 29% of patients had used the internet in the decision making process to visit a doctor (Sorensen, 2008). Nowadays, this indicator would be much higher.

Although, development of informational technologies considerably improved health consumers communication with health care system eHealth still has challenges. As consumers of healthcare services are different groups, they have different culture, education and past social experiences. Therefore, it is difficult to plan and design common eHealth system for all various groups of consumers. Another issue is consumers' ethnicity. As Nguyen and Bellamy concluded conducting more surveys would be necessary to examine impact of ethnic differences on health information needs. (Nguyen and Bellamy, 2006).

Online Health Information Portals

Continuous efforts to improve health care quality and protect patient's rights requires a complete online information portals of health care facilities, where every interested consumer is able to choose a desirable healthcare provider according to a profile of medical facilities, location, quality of provided services and other criteria. Currently, in an increasing number of countries various online portals offer information to health care consumers for making comparisons among hospitals and sometimes among family doctors as well. Active privatization of health care further actualized this issue. The studies demonstrated consumers' particular interest in web-sites that give them opportunity to compare different providers (e.g. hospitals) (TNS healthcare, 2010). In online searching process, other important aspects are to examine costs and waiting time of medical services. These information can be obtained through the USA and European countries informational portals (U.S. News Hospitals Rankings and Ratings, 2017; Health Consumers Powerhouse, 2010).

Health Consumers Powerhouse in their study have described five European Union (EU) countries with different kinds of user-friendly web portals aiming to inform citizens in need of a hospital or general practitioner visit of the qualities and capacity of such care providers. In spite of these portals are in acceptable quality still lot s of improvements are necessary in terms methodology, type and quality of information and etc. According to the authors, the Internet as an information source, which is available 24 hours and 7 days a week, plays a leading role in all thinkable areas of a consumer's life. In healthcare however, it is still in an initial stage and quality of care information has a long way to go before it can become a serious alternative to other information sources.

In the USA the uniformed hospital ranking system was created to increase the patients' awareness and their involvement in the prevention, diagnostic and treatment processes. Through this electronic ranking system every patient has opportunity to compare any hospital in USA and choose a relevant provider clinic. The following organizations are involved in the hospital ranking process: Joint Commission on Healthcare Organizations (JCAHO), Leapfrog, US News and World Report (USNews), and Centers for Medicare and Medicaid Hospital Compare (CMS). For example, Leapfrog Group is non-governmental organization, which has created the uniformed database with a rating score of each medical facility. The evaluation criteria include wide range of structure, process and outcome indicators. Analysis of the data provided by the Leapfrog Group gives opportunity to the medical service purchasers and the insurance companies to choose the desirable provider. For more motivation, The Leapfrog Group has established annual reward – The Leapfrog Top Hospitals. The prize is given into three different categories: Top Urban Hospitals, Top Rural Hospitals and Top Children's Hospitals.

Similar to some other countries, US consumer organizations play active role in providing information on hospital services to consumers. For example, Consumer Reports' developed the uniformed system of the clinics in USA. It is independent, non-profit organization aiming to educate consumers on various products. For hospitals Consumer Reports uses the following evaluation indicators: Patient Outcomes (prevention of infectious disease, re-hospitalization and mortality rates in the surgery department), Patient Experience (patient information about prices, co-payment, medicines, treatment schemes and communication between patients and clinic), and Hospital Practice (using of existing services for medical reason, avoiding of artificial increase the volume of medical services; for example, number of conducted cessation, CT and MRI etc. with no clear clinical indication).

Although all the rankings hope to identify "best" hospitals, they differ in methodology. Some emphasize surrogate markers; some emphasize safety, i.e., a lack of complications; some factor in the hospital's reputation; some factor in patient-centered outcomes. However, most do not emphasize traditional outcome measures such as mortality, mortality, length of stay and readmission rates. Some authors argue that although hospital rankings become popular whether these rankings identify better hospitals is unclear. To solve this issue Robbins and Gerkin recommended choosing more relevant criteria and including in hospital rankings more patient-centered outcomes such as mortality and readmission rates (Robbins & Gerkin, 2013).

Due to arrangement of healthcare system in the United Kingdom, the government is responsible for the safety and raising awareness of the patient and the quality of medical facilities. The Health and Social Care Information Center provides information for patients through NHS system. The main goal of this center is to provide information for patients about existing medical services, location of medical facilities, screening tests and score of the provider. For this purpose the health Department, NHS-England, Public Health Department of England and Health Quality Department created the uniformed on-line database, which is free of charge and easily accessible for each interested person.

Despite the fact that USA and European countries have national system of medical service providers' database, there was a need to compare and evaluate the clinics all over the world. For this purpose, the global ranking system was developed (worldwide – ranking web of hospitals). The clinics' scoring are based on web-analysis offered by Spanish research organization – Conejio Superior de Investigaciones Cientificas (CSIC). According to the global ranking system, everybody is able to compare and find a desired clinic. It is possible to find some Georgian medical facilities in this online global ranking system as well.

Georgian health care system

After the collapse of the USSR, maintaining former Semashko model was practically impossible in Georgia as a newly independent country experienced overwhelming economic and socio-political issues. Ethnic conflicts, causing massive movement of the population and influx of refugees, further exacerbated existing troubles. Because of budgetary problems and high inflation the salary of health personnel become too little that promoted informal payments. Maintaining oversupplied health infrastructure was impossible that further deteriorated quality of medical care. All these developments caused serious pressure on the Georgian authorities to reform the health care system and adjust it to new realities. However, the movement from the centralized, command-and-control system towards decentralized, more democratic structures was controversial process. Discussion on the reform of welfare system was largely absent from the political agenda during the first years of the independence. The main issue was lack of public health experts and skilled managers who could design and implement effective reforms. The institutional as well as technical capacity was quite weak in the country. Therefore, although there were some attempts of the Governments of Georgia (GoG) to modernize the health system, the success was little evident.

Due to the various reasons, GoG started planning their HSRs only mid-1990s. The role of international organizations and experts was substantial in this process. The first Georgian health sector reform (HSR) initiatives launched in 1995. The main element of it was changes in health financing system. GoG introduced user charges and co-payments. Additionally, social health insurance was initiated in the country. The focus on PHC was outlined as a priority. This process was accompanied by decentralization and partial privatization of health facilities and services.

Decentralization was marked feature of HSR in Georgia after the independence. Under the term of decentralization is mainly implied the devolution of responsibilities for service provision and financing (both in primary and secondary health care) from central to regional level. As a result, local health authorities and service providers acquired more institutional autonomy and their administrative rights and responsibilities expanded. However, in reality, the central government retained strong control over the system. It also became clear that the capacity of local health authorities and providers was weak and nobody took care of their capacity building. At the same time, the scope of responsibilities of regional and local authorities was not clearly defined. (Chanturidze et al. 2009). Therefore, full decentralization, in the Georgian health sector, has never taken place.

Soon it became clear that the implementation of HSRs was less successful and this process left substantial part of the population without quality health care services. Out-of-pocket payments became main way for paying of health care services. As a result the substantial part of Georgian health expenditure came from the private households' out-of-pocket payments. According to WHO, 80% of total health expenditure in Georgia came from the private households in 1998.

After the "Rose Revolution" in 2003, the new Government led by "National Movement" initiated radical changes in health care system as tried to implement neo-liberal reforms in all sectors of economy including health and social welfare. As a result the role of non-state providers considerably increased in providing and financing health care. More specifically, at the end of 2006 the GoG declared that all hospitals would be privatized and private insurance companies would be contracted to insure people living below the poverty line. For this purpose the database for people living below the poverty line was introduced in 2006. The GoG decisively moved to targeted, means-tested social assistance system meaning that only the poor can get assistance from the state.

Until 2007, only few private insurance companies owned any health insurance schemes and they had little interest to expand this service to general population. About 1% of the Georgian population was privately insured. The GoGs decision to insure the poorest population through private insurance companies have resulted steep increase in their numbers. Unlike many countries worldwide, the poorest and most vulnerable population in Georgia has become the major part of clients of private health insurance companies. At the same time, Georgian pharmaceutical companies have immensely benefited from liberal economic reforms. This statement is particularly true for two of them – PSP and Aversi. Owing to weak state regulation and liberal legislation these companies have substantially expanded their businesses. Importing pharmaceuticals has become just a part of these companies' activities. They have opened pharmaceutical factories, health clinics and even established health insurance companies.

Expanding role of the private for-profit sector has been accompanied by significant reduction of the state regulating functions. Such policy has caused significant deficiencies in quality and patients' safety control. This refers not only pharmaceuticals but also medical services delivered in private health facilities. In spite of some increases in public expenditure on health, it remained low and comprised 1.5% of GDP. This was the lowest indicator not only in the European regions but also in the Commonwealth of Independent States (CIS). Particularly low was public expenditure on public health and disease prevention and it was declined from 8% to 2% as a part public health expenditure during the period of 2001-2007 (WHO, 2009).

In October 1, 2012 parliamentary elections "National Movement" lost the power. Winning political coalition "Georgian Dream" decided to universally cover Georgian population with social and health insurance schemes. The government decided to move to universal health coverage and at the first stage introduced a minimal insurance package which covered about 2,2 million Georgians without any kind of health insurance. This program started at the end of February 2013. It included unlimited visits to family doctor and management of both outpatient and inpatient emergency cases (including some diagnostic tests). The GoG further extended Universal health Program after 1 July 2013. The extended package included not only emergency but also planned outpatient and inpatient services. The number of subsidized diagnostic tests has been increased compared to minimal insurance package as well. The role of non-state providers actually remained unchanged; currently they provide almost all care for non-communicable diseases. The benefit package was further modified and differentiated in 2017 which categorized the beneficiaries according to their income. This change left individuals with yearly income more than 40000 out of the program (MoLHSA, 2017).

Studies on health care behavior and utilization of medical services in Georgia

More than decade ago, health care seeking behavior (with focus on out-of-pocket payments) was studied among Georgian patients in Tbilisi (Gotsadze et al. 2005). The study was based on a household survey carried out in Tbilisi in 2000. By that time, financial accessibility represented major barrier to access to health services. As a result, the great majority of interviewed persons did not seek any kind of treatment or self-treated during the illness. Among 1706 cases that sought some type of treatment, only 32.5% went to a health care provider and 67.5% self-treated. Increased income, age, number of household members and perceived seriousness of the illness were all statistically significant factors growing the probability of seeking care. The survey indicated that in spite of greater necessity patients from oldest age group (66 years and older) and poor household did not seek much medical care compared to children and richer households. Out-of-pocket payments, which were legally allowed in Georgia during 1990ies health sector reforms, have become financial barriers to accessing quality care and have had a substantial impact upon patterns of care seeking.

Unlike to extensive research findings from other settings, education and gender did not reveal any statistically significant influence on health care seeking decision in Tbilisi, Georgia. As it was mentioned above, great number of international studies suggests that literacy plays important role on health care-seeking behaviour among women in developing countries (Lam et al. 2013). Improved literacy closely linked to better health outcomes, as it allows women to access health information and to more effectively navigate health systems (Sreeramareddy et al. 2006; Gorman & Pollitt, 1997; Glewwe, 1999; LeVine et al. 2012; LeVine et al. 2004; LeVine et al. 2001; Rowe et al. 2005).

The study found high rates of using ambulance (emergency) services among poor and patients with chronic diseases. This was coupled with low rates of primary health care utilization. Among those patients who decided to visit to health provider, 52% choose specialists and only 21% primary care (district) physicians. This trend was particularly evident among patients with chronic diseases – only 10% of them visited to district doctors. As authors emphasized "this reflects the total breakdown of the primary care level gate-keeping function, which was operational during the Soviet period. This care-seeking pattern amongst the chronically ill occurred despite the fact that specialists were a significantly more expensive source of care than district doctors or nurses" (Gotsadze et al. 2005). The main explanations of such behavior were financial considerations (specialist was perceived to offer better value for money than district doctors), low trust in professionalism of district doctors and geographical accessibility to providers (Belli et al. 2004).

As mentioned above, GoG introduced new state program – Medical Insurance for Poor (MIP) in 2007. According to various studies the program has positive effect on decreasing of out-of-pocket payments for acute inpatient medical care (Gotsadze et al. 2015; MoLHSA, 2011; Welfare Foundation, 2010). However, it failed to increase utilization of medical services, particularly for outpatient care. This can be explained by high rate of out-of-pocket-payments for outpatient medical services and pharmaceuticals. This trend is particularly visible among patients with chronic illnesses. On average, patients reporting a chronic illnesses 5.5 times less sought formal outpatient care and/or self-treated compared to patients with acute health problem or chronic illness with acute episode (Gotsadze et al. 2015).

Gotsadze et al. further interested in identifying determinants of outpatient services utilization in Georgia. For this purpose, the authors utilized dataset from Household Utilization and Expenditure Survey (HUES) conducted nationally in 2007 and 2010. Andersen behavioral model was employed to identify determinants of outpatient services utilization. The results indicated that a big part of surveyed population did not apply to medical services or self-treated during illnesses. From 10972 participants, who reported either chronic conditions that last longer than one year or reported any acute episodes (including chronic exacerbation) in the past 30 days prior to survey, only 2552 (23%) sought outpatient care. Self-perceived ill health was major individual factor determining health care utilization. Individuals who perceived their health as poor/very poor were significantly more likely to opt for outpatient care as opposed to no care or self-treatment. Both gender and age has significant influence on decision-making. For example, females were 15% more likely to use outpatient services compared to males (OR = 1.15, P < 0.05). Similarly, children below 14 years compared to people aged 45–64 were 2.02 and 2.85 times more likely to choose outpatient care over not treating or self-treating, respectively. When faced with a health problem, individuals aged 15–44 were 1.52 times more likely to opt for outpatient care over self-treatment (P < 0.01). However, the similar trend was not identified among persons who were 64 years or older. Educational status was another determining factor in seeking outpatient care. For example, people with a college or university degree were 1.27 times more likely (P < 0.05) to choose outpatient care over no treatment compared to individuals with less than high school education. At the same time, education had no influence when choosing between outpatient or self-treatment. Marital status did not have any significant influence on deciding treatment options.

An interesting 'predisposing' factor was identified during the study implementation. Compared to Georgians Armenians had higher odds (OR = 1.52) of using outpatient care versus no care (P < 0.01) and an OR=3.6 of choosing outpatient care over self-treatment (P < 0.01). Thus, ethnicity appeared as a strong predictor for outpatient service use as well as for seeking care from formal providers. However, the similar trend was not identified among other ethnic minorities residing in Georgia (e.g. Azeri).

From 'enabling' factors, out-of-pocket payments (OOPs) were identified as a major barrier in using outpatient services. According to the study, a one GEL increase in OOPs reduced the odds of seeking outpatient services by 2% (P < 0.01) versus no utilisation. At the same time, OOPs did not influence on individual's decision when choosing between outpatient care and self-treatment. The other enabling factors were household income and age as well as distance from outpatient care facility. The urban-rural location of the household, the supply of physicians, the regular source of care establishment and the type and availability of insurance had no influence on outpatient service utilization when adjusted for all other factors (except of polyclinics, which had a significant and positive influence on outpatient utilisation versus self-treatment (OR = 1.58, P < 0.05)).

In addition, the authors compared trends in utilization of outpatient services between 2007 and 2010. It was found out that odds of outpatient utilisation versus no treatment declined (OR = 0.80, P < 0.05), For example, compared to 2007 more people decided not to treat when ill in 2010. At the same time, people became 27% more likely to opt for outpatient care versus self-treatment (OR = 1.27, P < 0.05). Similar to previous study, significant and negative effect was identified between chronic illness and outpatient service use. The odds of outpatient service utilisation for patients with chronic conditions was 97% less (OR = 0.03, P < 0.01) compared to those reporting acute health problems.

The authors concluded that low income, 45-64 year-old males with low educational accomplishments who suffer from chronic illnesses have the lowest probability of using outpatient health services in comparison to other population groups. Expanding benefit package (including outpatient prescription drugs) in order to promote timely and effective utilization of outpatient services is the authors suggestion to policy-makers. For equity objectives, more expanded and comprehensive benefits for the poor is recommended as well (Gotsadze et al. 2017). These findings are good implication for policy-makers to adequately develop and redesign publicly funded health care programs.

Conclusion

There is immense evidence on the significant and growing influence of modern information technology on health seeking behavior. Information technology has potential to promote and positively influence on health care seeking behavior and thus make considerable impact in improving health and well-being of population, alleviate poverty, and increase efficiency and effectiveness of health care system. Currently, in an increasing number of developed countries various online portals offer information to health care consumers for making comparisons among hospitals and sometimes among doctors as well. However, many developing countries are lagged behind in this process. All recent papers on health care seeking behavior in Georgia mainly studied barriers to health care utilization. So far, no study exists that have analyzed the impact of modern information technologies on health seeking behavior of the patients (health care consumers) in Georgia. This is considerable challenge, particularly taking consideration amazing speed of contemporary informational technologies development and its great impact on actually all areas of our lives.

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Kupffer Cells Activity During Pathogenesis of Liver Diseases

Davit Tophuria[1], Maia Matoshvili[2]

Tbilisi State Medical University
Departments: Human Normal Anatomy[1], Dermatology and Venereology[2]

[1]Supervisor MD, PhD, Associate Professor; [2]MD, PhD, Assistant Professor

Summary

The resident liver macrophages Kupffer cells, have long been considered as mostly scavenger cells responsible for removing particulate material from the portal circulation. However, evidence derived mostly from animal models, indicates that Kupffer cells may be implicated in the pathogenesis of various liver diseases including viral hepatitis, steatohepatitis, alcoholic liver disease, intrahepatic cholestasis, activation or rejection of the liver during liver transplantation and liver fibrosis. There is accumulating evidence, reviewed in this paper, suggesting that Kupffer cells may act both as effector cells in the destruction of hepatocytes by producing harmful soluble mediators as well as antigen presenting cells during viral infections of the liver. Moreover they may represent a significant source of chemoattractant molecules for cytotoxic CD8 and regulatory T cells. Whether all these variable functions in the liver are mediated by different Kupffer cell subpopulations remains to be evaluated. In this review we propose a model that demonstrates the role of Kupffer cells in the pathogenesis of liver disease.

Abbreviations: SEC- sinusoidal endothelial cells, SC-stellate cells, LPS- lipopolysaccharide,

Key words: *Kupffer cells, Liver disease, Hepatic injury, Liver fibrosis, Hepatocellular carcinoma, Hepatitis.*

Introduction

The sinusoidal lining of the liver contains the nonparenchymal cell populations which consist of Kupffer cells (KCs), sinusoidal endothelial cells (SEC) and stellate cells (SC). All three cell-types seem to play a crucial role in liver homeostasis and in the pathogenesis of liver disease [1]. KCs constitute 80%-90% of the tissue macrophages in the reticuloendothelial system and account for approximately 15% of the total liver cell population [2]. They are mainly found in the periportal area of the lobule (43%), but KCs also exist in the midzonal (28%) and in the central area (29%) [2]. Despite the view that KCs are fixed tissue macrophages of the liver, there is evidence that they have the ability to migrate along sinusoidal walls with a mean speed of 4.6 ± 2.6 (SD) microns/min[3]. Since the description of these resident liver macrophages in 1876 by von Kupffer various theories have been proposed with regard to their origin and involvement in liver homeostasis and injury. It should be noted that almost all available evidence for the role of Kupffer cells comes from animal models. KCs are the first cells to be exposed to materials absorbed from the gastrointestinal tract. Their ability to eliminate and detoxify microorganisms, endotoxins, degenerated cells, immune complexes, and toxic agents (e.g. ethanol) is an important physiological function. Due to their key location, KCs might function as antigen-presenting cells [4] and participate in tumour surveillance [5] and the regeneration processes of the liver[6]. They also seem to play a key role in innate immune responses and host defence through the expression and secretion of soluble inflammatory mediators [7]. There is accumulating evidence that the interaction between KC and lipopolysaccharide (LPS) may be the initiating event leading to hepatotoxicity in various types of liver injury including endotoxinaemia, alcoholic liver injury and ischemia/reperfusion injury[8,9] and systemic viral infections[10].

The Role of Kupffer Cells I Hepatic Injury

Kupffer cells are involved in the pathogenesis of liver injury mediated by chemical substances, toxins and pharmacological agents such as carbontetrachloride (CCl4), endotoxin, galactosamine and acetaminophen through the release of biologically active substances that promote the pathogenic process. In liver injury and hepatocellular necrosis activated Kupffer cells are a major source of inflammatory mediators including cytokines, superoxide, nitric oxide, eicosanoids, chemokines, lysosomal and proteolytic enzymes and demonstrate increased cytotoxicity and chemotaxis.

The pivotal role of Kupffer cells in the initiation of hepatocellular damage is supported by experimental models that have demonstrated a correlation between the degree of activation of Kupffer cells and the degree of hepatocellular destruction. Administration of endotoxin to rats with activated Kupffer cells due to liver resection induced damage of endothelium, sinusoidal fibrin deposition, and lethal massive hepatic necrosis. In another rat model, activation with endotoxin enhanced CCl4-induced liver damage, while pretreatment with polymyxin B or administration of endotoxin in low doses induced immune tolerance which protected the liver from CCl4-induced damage. Other studies demonstrated that activated Kupffer cells express CD95L and could induce apoptosis in CD95+ T lymphocytes and hepatocytes. Liver fibrosis is a complex process that involves many cells of the hepatic sinusoid and is characterized by disturbance of the architecture and composition of extracellular matrix in the liver. The extracellular matrix in the subendothelial space of Disse mainly consists of collagen type IV, laminin, and proteoglycans that are progressively replaced during fibrosis by collagen type I and III. This excess deposition disrupts the normal architecture of the hepatic lobule. Ito or stellate cells are the main cellular source of extracellular matrix proteins in the liver. The initiation and maintenance of fibrogenesis in the liver is characterized by two processes. The former is characterized by the activation and transformation of Ito cells to myofibroblasts resulting in increased production of collagen types I and III. In parallel, there seems to be a disturbance of the homeostatic mechanisms involved in extracellular matrix deposition due to reduced expression of the proteolytic enzymes that degrade the extracellular matrix and increased expression of their inhibitors. Thus, maintaining fibrosis involves decreased production of matrix metalloproteinases (MMPs) and increased production of specific (tissue inhibitors of matrix metalloproteinases, TIMPs) or non specific metalloproteinase inhibitors (alpha1-antitrypsin), the another mechanism that could lead to the phenotypic change of Ito cells is the production of gelatinases by Kupffer cells. It has been demonstrated that extracellular matrix proteins play a crucial role in the maintenance of normal function of hepatocytes and Ito cells.

The Role of Kupffer Cells in Liver Infections

Kupffer cells are involved in the defence against infections of the liver. Their major role in the host defence and the prognosis of liver infection is indicated by studies in experimental models of sepsis. LPS pre-treatment has been shown to increase Kupffer cell numbers leading to a reduction of bacterial load and improvement of prognosis in a Salmonella septicemia model. Infection of mice with Listeria monocytogenes is a well studied liver infection model. In this model, the accumulation of bacillus in the liver depends on recognition of bacillus surface sugars and lectins by cognate receptors on Kupffer cells. On the other hand, production of inflammatory mediators such as IL-6, IL-12, IL-1β, TNF-α, and nitric oxide by infected Kupffer cells inhibits proliferation of the microorganism. Being the first line of defence, Kupffer cells also represent the portal of entry for viruses such as cytomegalovirus and parasites such as Plasmodium bergeiand Leishmania, which enter and proliferate in Kupffer cells and then infect the rest of the liver cells.

Kupffer Cells and Hepatocellular Carcinoma

The liver is a frequent site of hematogenous metastasis particularly for cancers of the gastrointestinal system. Isolated Kupffer cells were found to be cytotoxic against human colon adenocarcinoma cells and this cytotoxicity was increased significantly when the KC were stimulated with INF-γ and endotoxin. It has been suggested that this effect is related to TNF-α expression by Kupffer cells as it is inhibited by anti-TNF-α. Other studies have demonstrated that Kupffer cells induce Fas expression in colon cancer cells and malignant glioma cells leading to Fas-mediated apoptosis and death in the presence of tumour infiltrating lymphocytes or TNF-α. In vivo microscopy has shown that Kupffer cells are attracted to tumour cells in the hepatic circulation and have the ability to phagocytose these cells. Nitric oxide produced by Kupffer cells after stimulation with endotoxin, TNF-α and prostaglandin E2 may also be an effective weapon of the Kupffer cell machinery against tumor cells. Moreover, an indirect mechanism of defence by Kupffer cells against hepatic tumours is the induction of natural killer cell (NK-cell) cytotoxicity via the production of IL-12 and a possible anti-tumour effect of octreotide in hepatocellular carcinoma might, in part, be explained by its antiapoptotic effect on Kupffer cells.

Alcohol-Related Liver Disease and Kupffer Cells

Animal studies have shown that acute or chronic ethanol administration is associated with an increase in numbers of Kupffer cells that exhibit morphologic signs of cell activation[9], up regulation of CD14 expression and increased production of inflammatory mediators such as IL-1, TNF-α [99] and oxygen free radicals. Kupffer cell depletion with GdCl3 has been found to prevent early alcohol-induced liver inflammation and necrosis.

Kupffer Cells and Liver Transplantation

There is indirect evidence indicating that Kupffer cells may play a role in the process of graft rejection following liver transplantation mainly though their ability to act as antigen presenting cells (APC). Kupffer cells express MHC class II and have been found to be effective APC in vitro. Animal studies have shown that following liver transplantation Kupffer cells up-regulate MHC class II expression and this

has been associated with the initiation of the rejection process. In humans the rate of reconstitution of the graft with recipient-derived Kupffer cells has been found to increase during the rejection phase. Finally, graft rejection and the vanishing-bile duct syndrome occur more frequently in cases of MHC class I incompatibility accompanied by a MHC class II partial or complete match, which suggests that presentation of MHC I antigens of the biliary epithelium by donor Kupffer cells may also take place.

Kupffer Cells and Portal Hypertension

Kupffer cells have been shown to be the main source of thromboxane A2 production in the liver and this production is mediated by COX-1 and COX-2. Recently it was demonstrated that the infusion of endothelin-1 significantly increased portal pressure in animal models. This increase was mediated by the production of thromboxane A2 by the Kupffer cells, since both thromboxane synthase inhibition and thromboxane A2 receptor antagonists blocked the effect of endothelin-1 on portal pressure. Whether this is relevant to the situation in humans remains to be established.

Kupffer Cells and Intrahepatic Cholestasis

Kupffer cells have been implicated in the pathogenesis of intrahepatic cholestasis following hepatic ischaemia-reperfusion injury. Many hepatic canalicular transporters were reduced in parallel to the production of cytokines by Kupffer cells in an experimental model. Moreover, depletion of Kupffer cells abolished the reduced expression of transporters[10]. However, the role of Kupffer cells in cholestasis remains controversial. Recently, in bile duct ligated rats, selective anti-inflammatory blockade of Kupffer cells increased fibrosis and deposition of collagen I and III. More recently, in a bile duct ligated mouse model, depletion of Kupffer cells by intravenous inoculation of dichloromethylenediphosphonate resulted in high serum alanine transaminase levels and serious histologic portal inflammation and hepatocellular necrosis, indicating that Kupffer cells abrogate cholestatic liver injury in mice. Moreover it seems that the abrogation of liver injury in this model might be cytokine dependent, mostly through the production of IL-6 by Kupffer cells.

Results/conclusion:

Evidences derived mostly from animal models, indicates that Kupffer cells may be implicated in the pathogenesis of various liver diseases including viral hepatitis, steatohepatitis, alcoholic liver disease, intrahepatic cholestasis, activation or rejection of the liver during liver transplantation and liver fibrosis. There is accumulating evidence, reviewed in this paper, suggesting that Kupffer cells may act both as effector cells in the destruction of hepatocytes by producing harmful soluble mediators as well as antigen presenting cells during viral infections of the liver. Moreover they may represent a significant source of chemoattractant molecules for cytotoxic CD8 and regulatory T cells. Their role in fibrosis is well established as they are one of the main sources of TGFβ1 production, which leads to the transformation of stellate cells into myofibroblasts. Whether all these variable functions in the liver are mediated by different Kupffer cell subpopulations remains to be evaluated.

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Toxic Effects of Heavy Metals on the Human Organism

Davit Tophuria[1], Maia Matoshvili[2], Nikoloz Mzareulishvili[1], Zaza Dumbadze[3], Inga Kakhniashvili[4]

Tbilisi State Medical University
Departments: Human Normal Anatomy[1], Dermatology and Venereology[2], Human Normal Physiology[3], Clinical Skills
[1]Supervisor MD, PhD, Associate Professor; [2]MD, PhD, Assistant Professor; [3]MD, PhD, Assistant Professor;
[4]MD, PhD , Associate Professor

Summary

The toxic effects of these metals, even though they do not have any biological role, remain present in some or the other form harmful for the human body and its proper functioning. They sometimes act as a pseudo element of the body while at certain times they may even interfere with metabolic processes. Few metals, such as aluminium, can be removed through elimination activities, while some metals get accumulated in the body and food chain, exhibiting a chronic nature. Various public health measures have been undertaken to control, prevent and treat metal toxicity occurring at various levels, such as occupational exposure, accidents and environmental factors. Metal toxicity depends upon the absorbed dose, the route of exposure and duration of exposure, i.e. acute or chronic. This can lead to various disorders and can also result in excessive damage due to oxidative stress induced by free radical formation. This review gives details about some heavy metals and their toxicity mechanisms, along with their health effects.

Key words: *heavy metals, metal toxicity, oxidative stress, free radicals.*

Introduction

The main objective of this review is to provide insight into the sources of heavy metals and their harmful effects on the environment and living organisms. Heavy metals are generally referred to as those metals which possess a specific density of more than 5 g/cm^3 and adversely affect the environment and living organisms (Järup, 2003). These metals are quintessential to maintain various biochemical and physiological functions in living organisms when in very low concentrations, however they become noxious when they exceed certain threshold concentrations. Although it is acknowledged that heavy metals have many adverse health effects and last for a long period of time, heavy metal exposure continues and is increasing in many parts of the world. Heavy metals are significant environmental pollutants and their toxicity is a problem of increasing significance for ecological, evolutionary, nutritional and environmental reasons (Jaishankar *et al.*, 2013; Nagajyoti *et al.*, 2010). The most commonly found heavy metals in waste water include arsenic, cadmium, chromium, copper, lead, nickel, and zinc, all of which cause risks for human health and the environment (Lambert *et al.*, 2000). Heavy metals enter the surroundings by natural means and through human activities. Various sources of heavy metals include soil erosion, natural weathering of the earth's crust, mining, industrial effluents, urban runoff, sewage discharge, insect or disease control agents applied to crops, and many others.

Arsenic

Arsenic is one of the most important heavy metals causing disquiet from both ecological and individual health standpoints. It has a semimetallic property, is prominently toxic and carcinogenic, and is extensively available in the form of oxides or sulfides or as a salt of iron, sodium, calcium, copper, *etc.* (Singh *et al.*, 2007). Arsenic is the twentieth most abundant element on earth and its inorganic forms such as arsenite and arsenate compounds are lethal to the environment and living creatures. Humans may encounter arsenic by natural means, industrial source, or from unintended sources. Drinking water may get contaminated by use of arsenical pesticides, natural mineral deposits or inappropriate disposal of arsenical chemicals. Deliberate consumption of arsenic in case of suicidal attempts or accidental consumption by children may also result in cases of acute poisoning (Mazumder, 2008; Saha *et al.*, 1999). Arsenic is a protoplasmic poison since it affects primarily the sulfhydryl group of cells causing malfunctioning of cell respiration, cell enzymes and mitosis (Gordon & Quastel, 1948).

Lead

Lead is a highly toxic metal whose widespread use has caused extensive environmental contamination and health problems in many parts of the world. It begins to tarnish on contact with air, thereby forming a complex mixture of compounds, depending on the given conditions. The sources of lead exposure include mainly industrial processes, food and smoking, drinking water and domestic sources. The sources of lead were gasoline and house paint, which has been extended to lead bullets, plumbing pipes, pewter pitchers, storage batteries, toys and faucets (Thürmer *et al.*, 2002).. Some is taken up by plants, fixation to soil and flow into water bodies, hence human exposure of lead in the general population is either due to food or drinking water Lead is an extremely toxic heavy metal that disturbs various plant physiological processes and unlike other metals, such as zinc, copper and manganese, it does not play any biological functions.

A plant with high lead concentration fastens the production of reactive oxygen species (ROS), causing lipid membrane damage that ultimately leads to damage of chlorophyll and photosynthetic processes and suppresses the overall growth of the plant (Najeeb *et al.*, 2014). Some research revealed that lead is capable of inhibiting the growth of tea plant by reducing biomass and debases the tea quality by changing the quality of its components (Yongsheng *et al.*, 2011).

Mercury

The metallic mercury is a naturally occurring metal which is a shiny silver-white, odorless liquid and becomes colorless and odorless gas when heated. Mercury is very toxic and exceedingly bioaccumulative. Its presence adversely affects the marine environment and hence many studies are directed towards the distribution of mercury in water environment. Major sources of mercury pollution include anthropogenic activities such as agriculture, municipal wastewater discharges, mining, incineration, and discharges of industrial wastewater. Mercury exists mainly in three forms: metallic elements, inorganic salts and organic compounds, each of which possesses different toxicity and bioavailability. These forms of mercury are present widely in water resources such as lakes, rivers and oceans where they are taken up by the microorganisms and get transformed into methyl mercury within the microorganism, eventually undergoing biomagnification causing significant disturbance to aquatic lives. Consumption of this contaminated aquatic animal is the major route of human exposure to methyl mercury. Mercury is extensively used in thermometers, barometers, pyrometers, hydrometers, mercury arc lamps, fluorescent lamps and as a catalyst. It is also being used in pulp and paper industries, as a component of batteries and in dental preparations such as amalgams.

Cadmium

Cadmium is the seventh most toxic heavy metal as per ATSDR ranking. It is a by-product of zinc production which humans or animals may get exposed to at work or in the environment. Once this metal gets absorbed by humans, it will accumulate inside the body throughout life. This metal was first used in World War I as a substitute for tin and in paint industries as a pigment. In today's scenario, it is also being used in rechargeable batteries, for special alloys production and also present in tobacco smoke. About three-fourths of cadmium is used in alkaline batteries as an electrode component, the remaining part is used in coatings, pigments and platings and as a plastic stabilizer. Humans may get exposed to this metal primarily by inhalation and ingestion and can suffer from acute and chronic intoxications. Cadmium distributed in the environment will remain in soils and sediments for several decades. Plants gradually take up these metals which get accumulated in them and concentrate along the food chain, reaching ultimately the human body. In the US, more than 500,000 workers get exposed to toxic cadmium each year as per The Agency for Toxic Substances and Disease Registry (Bernard, 2008; Mutlu *et al.*, 2012). Researches have shown that in China the total area polluted by cadmium is more than 11,000 hectares and its annual amount of industrial waste of cadmium discharged into the environment is assessed to be more than 680 tons. In Japan and China, environmental cadmium exposure is comparatively higher than in any other country (Han *et al.*, 2009). Cadmium is predominantly found in fruits and vegetables due to its high rate of soil-to-plant transfer (Satarug *et al.*, 2011). Cadmium is a highly toxic nonessential heavy metal that is well recognized for its adverse influence on the enzymatic systems of cells, oxidative stress and for inducing nutritional deficiency in plants (Irfan *et al.*, 2013).

Aluminum

Aluminum is the third most abundant element found in the earth's crust (Gupta *et al.*, 2013). Aluminum occurs naturally in the air, water and soil. Mining and processing of aluminum elevates its level in the environment. Recent investigations on environmental toxicology revealed that aluminum may present a major threat for humans, animals and plants in causing many diseases (Barabasz *et al.*, 2002). Many factors, including pH of water and organic matter content, greatly influence the toxicity of aluminum. A pH of surface layer of soil below 5 (pH<5) can lead to soil acidity which is a major concern around the world that affects crop production. Due to aluminum toxicity, the crop production was constrained to 67% of the total acid soil area in the world. Aluminum is one of the most commonly found elements in the earth crust. Due to acid soils (pH<5), silicon gets leached leaving behind aluminum in solid form known as aluminum ox hydroxides, such as gibbsite and boehmite. These unstable forms of aluminum discharge phytotoxic Al^{3+} well-known as Al $(OH)^{63+}$ in soil (Ermias Abate *et al.*, 2013). The interaction of Al^{3+} with apoplastic, plasma membrane, and symplastic targets leads to toxicity and distracts the physical and cellular processes in plants. The common manifestations are root growth inhibition, cellular modification in leaves, small and dark green leaves, yellowing and death of leaves, chlorosis, purpling and foliar necrosis (Gupta *et al.*, 2013). Enzymes such as hexokinase, phosphodiesterase, alkalic phosphatase and phosphoxidase are inhibited by aluminum since it has a greater affinity to DNA and RNA. Metabolic pathways in the living organism involving calcium, phosphorous, fluorine and iron metabolism are affected by aluminum. Aluminum has been found to be very harmful to nervous, osseous and hemopoietic cells.

Iron

Iron is the second most abundant metal on the earth's crust (EPA, 1993). Iron is a most crucial element for growth and survival of almost all living organisms (Valko *et al.*, 2005).

It is one of the vital components of organisms like algae and of enzymes such as cytochromes and catalase, as well as of oxygen transporting proteins, such as hemoglobin and myoglobin (Vuori, 1995). Iron is an attractive transition metal for various biological redox processes due to its inter -conversion between ferrous (Fe^{2+}) and ferric (Fe^{3+}) ions (Phippen *et al.*, 2008). The source of iron in surface water is anthropogenic and is related to mining activities. The production of sulphuric acid and the discharge of ferrous (Fe^{2+}) takes place due oxidation of iron pyrites (FeS_2) that are common in coal seams (Valko *et al.*, 2005). A study of iron toxicity on aquatic plants, particularly rice, reported that the growth of species of aquatic reed was found to be inhibited by concentration of 1 mg/L total iron (Phippen *et al.*, 2008). Acid soils restrict rice production and together with Zn deficiency cause a macronutrient disorder in wetland rice. The production of lowland rice was greatly affected by high concentrations of reduced iron (Fe^{2+}) in the flooded soils. The features of iron toxicity in rice include high uptake of Fe^{2+} by roots, acropetal translocation into leaves, bronzing of rice leaves and yield loss (Becker & Asch, 2005).

Effects of heavy metals on humans

There are 35 metals that are of concern for us because of residential or occupational exposure, out of which 23 are heavy metals: antimony, arsenic, bismuth, cadmium, cerium, chromium, cobalt, copper, gallium, gold, iron, lead, manganese, mercury, nickel, platinum, silver, tellurium, thallium, tin, uranium, vanadium, and zinc (Mosby *et al.* 1996). These heavy metals are commonly found in the environment and diet. In small amounts they are required for maintaining good health but in larger amounts they can become toxic or dangerous. Heavy metal toxicity can lower energy levels and damage the functioning of the brain, lungs, kidney, liver, blood composition and other important organs. Long-term exposure can lead to gradually progressing physical, muscular, and neurological degenerative processes that imitate diseases such as multiple sclerosis, Parkinson's disease, Alzheimer's disease and muscular dystrophy. Repeated long-term exposure of some metals and their compounds may even cause cancer.

Arsenic effects

Most of the paints, dyes, soaps, metals, semi-conductors and drugs contain arsenic. Certain pesticides, fertilizers and animal feeding operations also release arsenic to the environment in higher amounts. The inorganic forms of arsenic such as arsenite and arsenate are found to be more dangerous to human health. They are highly carcinogenic and can cause cancer of lungs, liver, bladder and skin. Humans are exposed to arsenic by means of air, food and water. Drinking water contaminated with arsenic is one of the major causes for arsenic toxicity in more than 30 countries in the world (Chowdhury *et al.*, 2000). Water may get contaminated through improperly disposed arsenical chemicals, arsenical pesticides or by natural mineral deposits. Arsenic toxicity can be either acute or chronic and chronic arsenic toxicity is termed as arsenicosis. Most of the reports of chronic arsenic toxicity in man focus on skin manifestations because of its specificity in diagnosis. Pigmentation and keratosis are the specific skin lesions that indicate chronic arsenic toxicity (Martin & Griswold, 2009).

Figure 1 shows arsenic keratosis, so called “raindrops on a dusty road” .

Figure 1. Arsenic keratosis, so called “raindrops on a dusty road”

Figure 2. Skin lesions due to arsenicosis

Lower levels of arsenic exposure can cause nausea and vomiting, reduced production of erythrocytes and leukocytes, abnormal heart beat, pricking sensation in hands and legs, and damage to blood vessels. Long-term exposure can lead to the formation of skin lesions, internal cancers, neurological problems, pulmonary disease, peripheral vascular disease, hypertension and cardiovascular disease and diabetes mellitus (Smith *et al.,* 2000). Chronic arsenicosis results in many irreversible changes in the vital organs and the mortality rate is higher. In spite of the magnitude of this potentially lethal toxicity, there is no effective treatment for this disease (Mazumder, 2008).

Lead

Human activities such as mining, manufacturing and fossil fuel burning has resulted in the accumulation of lead and its compounds in the environment, including air, water and soil. Lead is used for the production of batteries, cosmetics, metal products such as ammunitions, solder and pipes, *etc.* (Martin & Griswold, 2009). Lead is highly toxic and hence its use in various products, such as paints, gasoline, *etc.*, has been considerably reduced nowadays. The main sources of lead exposure are lead based paints, gasoline, cosmetics, toys, household dust, contaminated soil, industrial emissions (Gerhardsson *et al.*, 2002). Lead poisoning was considered to be a classic disease and the signs that were seen in children and adults were mainly pertaining to the central nervous system and the gastrointestinal tract (Markowitz, 2000). Lead poisoning can also occur from drinking water. The pipes that carry the water may be made of lead and its compounds which can contaminate the water (Brochin *et al.*, 2008).

According to the Environmental Protection Agency (EPA), lead is considered a carcinogen. Acute exposure can cause loss of appetite, headache, hypertension, abdominal pain, renal dysfunction, fatigue, sleeplessness, arthritis, hallucinations and vertigo. Acute exposure mainly occurs in the place of work and in some manufacturing industries which make use of lead. Chronic exposure of lead can result in mental retardation, birth defects, psychosis, autism, allergies, dyslexia, weight loss, hyperactivity, paralysis, muscular weakness, brain damage, kidney damage and may even cause death (Martin & Griswold, 2009).

Mercury

Mercury poisoning is referred to as acrodynia or pink disease. Mercury is released into the environment by the activities of various industries such as pharmaceuticals, paper and pulp preservatives, agriculture industry, and chlorine and caustic soda production industry (Morais *et al.*, 2012). Mercury has the ability to combine with other elements and form organic and inorganic mercury. Exposure to elevated levels of metallic, organic and inorganic mercury can damage the brain, kidneys and the developing fetus (Alina *et al.*, 2012). Mercury is present in most foods and beverages in the range <1 to 50 μg/kg. In marine foods it is often seen at higher levels. EPA has declared mercuric chloride and methyl mercury to be highly carcinogenic. The nervous system is very sensitive to all types of mercury. Increased exposure of mercury can alter brain functions and lead to shyness, tremors, memory problems, irritability, and changes in vision or hearing. Exposure to metallic mercury vapors at higher levels for shorter periods of time can lead to lung damage, vomiting, diarrhea, nausea, skin rashes, increased heart rate or blood pressure. Symptoms of organic mercury poisoning include depression, memory problems, tremors, fatigue, headache, hair loss, *etc.* Since these symptoms are common also in other conditions, it may be difficult to diagnose such cases (Martin & Griswold, 2009).

Cadmium

Cadmium is a metal of the 20th century. It is a byproduct of zinc production. Soils and rocks, including coal and mineral fertilizers, contain some amount of cadmium. Cadmium has many applications, *e.g.* in batteries, pigments, plastics and metal coatings and is widely used in electroplating (Martin & Griswold, 2009). presents a relative contribution of different sources to human cadmium exposure (Regoli, 2005). Cadmium and its compounds are classified as Group 1 carcinogens for humans by the International Agency for Research on Cancer (Henson & Chedrese, 2004). Cadmium is highly toxic to the kidney and it accumulates in the proximal tubular cells in higher concentrations. Cadmium can cause bone mineralization either through bone damage or by renal dysfunction. Inhaling higher levels of cadmium can cause severe damage to the lungs. If cadmium is ingested in higher amounts, it can lead to stomach irritation and result in vomiting and diarrhea. On very long exposure time at lower concentrations, it can become deposited in the kidney and finally lead to kidney disease, fragile bones and lung damage. Tobacco is the main source of cadmium uptake in smokers as tobacco plants, like other plants, can accumulate cadmium from the soil.

Aluminum

The main routes of aluminum consumption by humans are through inhalation, ingestion and dermal contact and sources of exposure are drinking water, food, beverages, and aluminum containing drugs. Symptoms that indicate the presence of higher amounts of aluminum in the human body are nausea, mouth ulcers, skin ulcers, skin rashes, vomiting, diarrhea and arthritic pain. Aluminum exposure is probably a risk factor for the onset of Alzheimer disease (AD) in humans, as hypothesized by the WHO, Contact dermatitis and irritant dermatitis were seen in persons who were exposed to aluminum in their place of work. Aluminum showed adverse effects on the nervous system and resulted in loss of memory, problems with balance and loss of co-ordination (Krewski *et al.*, 2009). People suffering from kidney diseases find it difficult to eliminate aluminum from the body, resulting in aluminum accumulation in the body leading to bone and brain damage. Some factors that would likely be the reason for the development of aluminum toxicity are life in dusty environments, long-term intravenous nutrition, diminished kidney function, hemodialysis, drinking or ingesting substances that are high in aluminum content, working in an environment that contains high levels of aluminum. Patients undergoing kidney dialysis may get exposed to aluminum present in contaminated dialysates and phosphate binders.

Iron

Iron poisoning has always been a topic of interest mainly to pediatricians. Children are highly susceptible to iron toxicity as they are exposed to a maximum of iron-containing products (Albretsen, 2006). Iron toxicosis occurs in four stages. The first stage which occurs after 6 hrs of iron overdose is marked by gastrointestinal effects such as gastro intestinal bleeding, vomiting and diarrhea (Osweiler *et al.*, 1985). The second stage progresses within 6 to 24hrs of overdose and it is considered as the latent period, a period of apparent medical recovery. The third stage occurs between 12 to 96 hrs after the onset of certain clinical symptoms. This stage is characterized by shocks, hypotension, lethargy, tachycardia, hepatic necrosis, metabolic acidosis and sometimes death (Hillman, 2001). The fourth stage occurs within 2–6 weeks of iron overdose. This stage is marked by the formation of gastrointestinal ulcerations and development of strictures. Excess iron uptake is a serious problem in developed and meat eating countries and it increases the risk of cancer. It is said that asbestos associated cancer is linked to free radicals. Loose intracellular iron can also promote DNA damage. Iron can initiate cancer mainly by the process of oxidation of DNA molecules.

Conclusion:

In this review we reviewed the effects of some heavy metals, *i.e.* arsenic, lead, mercury, cadmium, aluminum and iron, on the environment and living organisms, mainly human beings. Effective legislation, guidelines and detection of the areas where there are higher levels of heavy metals are necessary. Failure to control the exposure will result in severe complications in the future because of the adverse effects imposed by heavy metals. Occupational exposure to heavy metals can be decreased by engineering solutions. Monitoring the exposure and probable intervention for reducing additional exposure to heavy metals in the environment and in humans can become a momentous step towards prevention. National as well as international co-operation is vital for framing appropriate tactics to prevent heavy metal toxicity.

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2015-2016 წლებში ქ. თბილისში პროსტატის კიბოთი ავადობისა და სკრინინგის თავისებურებანი

მარი თვალიაშვილი[1], თამარ ლობჟანიძე[2], ვასილ ტყეშელაშვილი[3]

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
[1]სტუდენტი ბაკალავრი, ჯანდაცვის ადმინისტრირება; [2]ხელმძღვანელი, სკოლის დირექტორი;
[3]ხელმძღვანელი, მედიცინის მეცნიერებათა დოქტორი, პროფესორი

GLOBOCAN/IARC (2012) მონაცემებით მსოფლიოში პროსტატის კიბოთი ყოველწლიურად ავადდება 1.1 მილიონი და ამავე მიზეზით გარდაიცვლება 307,000 მამაკაცი. ჩვენს მიერ ჩატარდა დესკრიპტული ეპიდემიოლოგიური კვლევა. 2015-2016 წლებში თბილისში ყოველ 100,000 მამაკაცზე პროსტატის კიბოთი ყოველწლიურად ავადდებოდა, უხეში მაჩვენებელის მიხედვით, 35 მამაკაცი, ხოლო ASR-ით - 27.3. a_i-ს მიხედვით პროსტატის კიბოთი ავადობის სიხშირე 55-59 წლის ასაკიდან მკვეთრად მატულობს და აღწევს პიკურ დონეებს 75-79 ასაკობრივ ჯგუფში (299.3‰-301.7‰). დადგენილი იქნა, რომ SRR-ით თბილისში პროსტატის კიბოთი ავადობის დონე 2.4-ჯერ დაბალია ევროპის ქალაქებში რეგისტრირებული ავადობის საშუალო დონესთან (65.0) შედარებით. ამავე დროს, თბილისში პროსტატის კიბოთი ავადობის დონე 3.3-ჯერ დაბალია ევროპაში ავადობის პიკურ დონესთან შედარებით, რომელიც დაფიქსირდა იტალიის ქ.მოდენაში (89.3) და 3-ჯერ დაბალი-მიუნხენთან შედარებით (82.5). თბილისში პროსტატის კიბოთი ავადობის სიხშირე 1.4-ჯერ დაბალი იყო ევროპაში ამ ლოკალიზაციის კიბოთი ავადობის ყველაზე დაბალ დონესთან შედარებით, რომელიც რეგისტრირებულ იქნა იტალიის ქ.ნეაპოლში (37.5). თბილისის ანალოგიური სიხშირე დაფიქსირდა ქ.ტრაპზონში (27.3). TASR-ის მიხედვით 2015-2016 წლებში თბილისში 50-69 წლის ასაკობრივ პერიოდში ყოველ 100 000 მამაკაცზე პროსტატის კიბოთი ყოველწლიურად ავადდებოდა 100 მამაკაცი, 55-79 წლის ასაკობრივ პერიოდში-173,ხოლო 60-79 წლის ასაკობრივ პერიოდში-225. TSRR-ის მიხედვით 50-69 წლის ასაკობრივ ჯგუფთან შედარებით 55-79 წლის ასაკობრივ ჯგუფში პროსტატის კიბოთი ავადობა მაღალია 1.7-ჯერ, ხოლო 60-79 წლის ასაკობრივ ჯგუფში -2.3-ჯერ. RF-ის მიხედვით 50-69 წლის ასაკობრივ პერიოდში ვლინდება პროსტატის კიბოს შემთხვევების 53.1%, 55-79 წლის ასაკობრივ პერიოდში-87.7%, ხოლო 60-79 წლის ასაკობრივ პერიოდში-80.9%. PSA სკრინინგით მოსარგებლე მამაკაცების ჯგუფში შედარებით მაღალია პროსტატის კიბოს შემთხვევების გამოვლენა I-II კლინიკურ სტადიებში (52.6%). დადგენილი იქნა, რომ თბილისის მამაკაცთა მოსახლეობის 50-69 წლის ასაკობრივი ჯგუფის 50% PSA სკრინინგით მოცვის შემთხვევაში პროგრამის ღირებულება იქნება 572,703.30 ₾, ხოლო 70% მოცვისას 631,089.90 ₾. 55-79 წლის ასაკობრივი ჯგუფის 50%-ის სკრინინგით მოცვის შემთხვევაში პროგრამის ღირებულება შეადგენს 402,606 ₾, ხოლო 70% მოცვისას-563,648.00 ₾. 60-79 წლის ასაკობრივი ჯგუფის 50% სკრინინგით მოცვის შემთხვევაში პროგრამის ღირებულება 289,827 ₾, ხოლო 70% მოცვისას 405,757.80 ₾. დადგენილი იქნა PSA სკრინინგით მოცვის ყველაზე ხარჯთ-ეფექტური ასაკობრივი ჯგუფი: 60-79 წლები, რომელშიც ვლინდება პროსტატის კიბოს შემთხვევათა 27.8%-ით მეტი და რომლის 50% და 70% -ს სკრინინგით მოცვის შემთხვევაში დაიზოგება, შესაბამისად 282,876.30 ₾ და 225,332.10 ₾, 50-69 წლის ასაკობრივი ჯგუფის ანალოგიური მოცულობით მოცვებთან შედარებით. პროსტატის კიბოს სკრინინგ-პროგრამის ხარჯთ-ეფექტურობისა და სერვისის მიწოდების ხარისხის გაზრდის მიზნით რეკომენდებულია: პროგრამის გაიდლაინში ცვლილებების შეტანა და 50-70 წლის ასაკობრივი ჯგუფის ნაცვლად PSA სკრინინგის ჩატარება 60-79 წლის ასაკობრივი ჯგუფის მამაკაცებში; უსიმპტომო მამაკაცებში განმეორებითი PSA ტესტირება ორ წელიწადში ერთხელ; მონაცემთა ელექტრონული ბაზის ხარისხის გაუმჯობესება, კიბოს კლინიკური სტადიებისა და სკრინინგ-პროგრამაში პაციენტთა მონაწილეობის შემთხვევების რეგისტრირება; PSA სკრინინგით მამაკაცთა სამიზნე ჯგუფის მოცვის გაზრდა.

აბრევიატურა: *IARC-კიბოს კვლევის საერთაშორისო სააგენტო; ASR-წლოვანებით სტანდარტიზებული მაჩვენებელი, TASR-შეკვეცილი წლოვანებით სტანდარტიზებული მაჩვენებელი, a_i-ასაკისთვის სპეციფიური სიხშირის მაჩვენებელი, SRR-სტანდარტიზებული მაჩვენებლების შეფარდება, TSRR-შეკვეცილი სტანდარტიზებული მაჩვენებლების შეფარდება, RF-შეფარდებითი სიხშირის მაჩვენებელი, PSA-პროსტატ-სპეციფიკური ანტიგენი.*

საკვანძო სიტყვები: *პროსტატის კიბო, PSA სკრინინგი, თბილისი.*

ფილტვის კიბოს გავრცელება, რისკები და მათი მართვა

ეკა თოფურია[1], ვასილ ტყეშელაშვილი[2]

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
[1]მაგისტრანტი, საზოგადოებრივი ჯანმრთელობა და ჯანდაცვით პოლიტიკა; [2]ხელმძღვანელი, მედიცინის მეცნიერებათა დოქტორი, პროფესორი

ფილტვის კიბო თანამედროვე ონკოლოგიის ერთ-ერთ ყველაზე აქტუალურ პრობლემას წარმოადგენს. ფილტვის კიბოთი ყოველწლიურად 1 მლნ., ყოველდღიურად კი 3.000 ადამიანი იღუპება, ეს იმას ნიშნავს, რომ ყოველ ნახევარ საათში პლანეტის რომელიმე წერტილში ერთი ადამიანი მაინც კვდება ფილტვის კიბოს გამო. დაავადებას უკავშირებენ თამბაქოს მწეველთა რაოდენობის მკვეთრ ზრდას, ჰაერში გადასული სამრეწველო ნარჩენების შესუნთქვას და სასუნთქი გზების ქრონიკული ანთებების არსებობას. სიგარეტის მოწევა განაპირობებს ფილტვის კიბოს შემთხვევათა დაახლოებით 90%-ს. თამბაქოს ბოლი საშიშია დახურულ შენობაში არამწეველთათვისაც. ფილტვის კიბოთი დაავადების რისკი მნიშვნელოვნად მატულობს, როცა თამბაქოს მოწევა შერწყმულია სხვა კანცეროგენული ფაქტორების ზემოქმედებასთან. ფილტვის კიბოს მომატებული რისკის ჯგუფს მიეკუთვნებიან: თამბაქოს მწეველები, განსაკუთრებით 50 წელს გადაცილებულები და 25 წელზე მეტი ხანგრძლივობის მწეველობის სტაჟით; ადამიანები, რომლებსაც ხანგრძლივი დროის განმავლობაში ჰქონდათ კონტაქტი აზბესტის, ქრომის, ნიკელის, დარიშხანის ნაერთებთან და მათ წარმოებასთან; დაბინძურებულ გარემოში ხანგრძლივად მცხოვრები ადამიანები და სასუნთქი გზების ქრონიკული ანთებითი დაავადებების მქონე პირები. მიუხედავად საზოგადოებრივი ჯანმრთელობის ინტერვენციებსა და სამედიცინო მომსახურების ხელმისაწვდომობის გაუმჯობესების ცალსახა პროგრესისა, არაგადამდები დაავადებები (აგდ) კვლავაც მნიშვნელოვან გამოწვევად რჩება საქართველოს ჯანდაცვის სისტემისათვის. ჯანმრთელობის მსოფლიო ორგანიზაციის 2014 წლის ანგარიშის მიხედვით, საქართველოში სიკვდილიანობის 94% გამოწვეულია არაგადამდები დაავადებებით. ამასთან, მოდის 14% მოდის - ონკოლოგიურ დაავადებებზე. ფილტვის კიბოს რისკების მართვის მიზნით რეკომენდებულია: (1) საერთაშორისო თანამშრომლობის და ეროვნულ დონეზე პროპაგანდის გაძლიერება აგდ პრევენციის და კონტროლის ღონისძიებების ქვეყნის ჯანდაცვის ერთ-ერთ უმნიშვნელოვანეს პრიორიტეტად აღიარების მისაღწევად; (2) ეროვნული შესაძლებლობების გაძლიერება აგდ პრევენციის და კონტროლის ღონისძიებათა შემუშავებაში, განხორციელებასა და შეფასებაში; (3) აგდ და მათთან ასოცირებული დეტერმინანტების მონიტორინგისა და ეპიდზედამხედველობის გაძლიერება; (4) აგდ რისკის ფაქტორების მოდიფიცირების გაუმჯობესება ჯანმრთელობის ხელშეწყობის და მოსახლეობის ინფორმირებულობის ამაღლების გზით; (5) აგდ და ბიოლოგიური რისკის ფაქტორების სკრინინგი და მართვა; (6) აგდ მართვის სამედიცინო მომსახურებასა და მის მედიკამენტურ მკურნალობაზე ფინანსური ხელმისაწვდომობის გაუმჯობესება; (7) აგდ და რისკის ფაქტორების სკრინინგის და მართვის ხარისხის გაუმჯობესება.

საკვანძო სიტყვები: *არაგადამდები დაავადებები, პრევენცია, სიკვდილიანობა, რისკის ფაქტორები*

ღვიძლის კიბოს გავრცელება, რისკები და მათი მართვა

მარიამ ნადირაშვილი

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
მაგისტრანტი, საზოგადოებრივი ჯანდაცვა და ჯანდაცვის პოლიტიკა

ღვიძლის კიბო ავთვისებიანი სიმსივნეების დაახლოებით 1-1,5%-ს შეადგენს. იგი განსაკუთრებით დიდ პრობლემას ნაკლებად განვითარებულ ქვეყნებში ქმნის, სადაც, არსებული შეფასების მიხედვით, 2012 წელს მსოფლიოში დიაგნოსტირებული 782 000 ახალი შემთხვევიდან 83% გამოვლინდა. 2012 წელს მამაკაცებში გამოვლენილი 554 000 და ქალებში დიაგნოსტირებული 228 000 ახალი შემთხვევით იგი მამაკაცთა შორის მეხუთე ადგილზეა, ხოლო ქალთა შორის - მეცხრე ადგილზე. მამაკაცებში მაღალი ინციდენტობის რეგიონებს აღმოსავლეთი და სამხრეთ-აღმოსავლეთ აზია (ასაკ-სტანდარტიზებული ინციდენტობის მაჩვენებლებია 31.9 და 22.2 შესაბამისად) წარმოადგენს. საშუალო მაჩვენებლები ვლინდება სამხრეთ ვროპასა (9.5) და ჩრდილოეთ ამერიკაში (9.3), ხოლო ყველაზე დაბალი მაჩვენებლებია ჩრდილოეთ ევროპასა (4.6) და სამხრეთ-ცენტრალურ აზიაში (3.7). ქალებში მაჩვენებლები გაცილებით დაბალია, ყველაზე მაღალი მაჩვენებელი ვლინდება აღმოსავლეთ აზიასა და აფრიკის დასავლეთში (10.2 და 8.1 შესაბამისად), ხოლო ყველაზე დაბალი - ჩრდილოეთ ევროპაში (1.9). მთელს მსოფლიოში ღვიძლის კიბოს განვითარების მთავარი რისკ-ფაქტორებია ჰეპატიტის ვირუსით ინფიცირება და აფლატოქსინით დაბინძურებული საკვების გამოყენება. ქრონიკული ვირუსული ჰეპატიტები - როგორც ციროზის განვითარებით, ისე პირდაპირ იწვევენ ღვიძლის სიმსივნურ გადაგვარებას. დღეს სერიოზული სამუშაოები მიმდინარეობს ვირუსული B ჰეპატიტის პროფილაქტიკური ვაქცინაციის ირგვლივ, რამდენადაც ჰეპატოცელულარული კარცინომის ყველაზე ხშირ მიზეზს სწორედ იგი წარმოადგენს; ბავშვებში B ჰეპატიტის საწინააღმდეგო აცრებმა შეამცირა ჰეპატიტის ინფექციის გავრცელება ჩინეთში, კორეაში და დასავლეთ აფრიკაში. ასევე აღსანიშნავია ნებისმიერი ეტიოლოგიის ღვიძლის ციროზი, ალკოჰოლური ინტოქსიკაცია, ნაღველგამომტანი გზების დაავადებები, ქიმიური თუ მედიკამენტური მოწამვლა. განვითარებულ ქვეყნებში ღვიძლის კიბო შემთხვევათა 80-90%-ში ალკოჰოლური ციროზის ფონზე ვითარდება; პრევენციული ღონისძიებები სამ ნაწილად იყოფა: პირველადი, მეორეული და მესამეული პრევენცია. კიბოს გავრცელების შემცირებაზე მიმართული ინტერვენციების განხორციელება შეუძლებელია სარწმუნო და ხარისხიანი მონაცემების გარეშე. კიბოს კვლევის საერთასორისო სააგენტოს რეკომენდაციით, განვითარებად ქვეყნებში, სადაც ავადობის და სიკვდილიანობის შესახებ მონაცემთა ხარისხი არასათანადოა, რეკომენდებულია კიბოს რეგისტრის შემოღება. ონკოლოგიური დაავადების პროფილაქტიაში მნიშვნელოვანი ადგილი უკავია ჰეპატიტების წინააღმდეგ ბრძოლას, ჯანსაღი ცხოვრების წესის დანერგვას. ასევე მნიშვნელოვანია ჯანდაცვის პირველადი რგოლის ექიმების, ექთნების განათლება კიბოს განვითრების ხელშემწყობი რისკის ფაქტორების და პაციენტთა კონსულტირების შესახებ.

საკვანძო სიტყვები: *ღვიძლის კიბო, გავრცელება, რისკები, მართვა*

სარძევე ჯირკვლის კიბოს გავრცელება, რისკი და მართვა

რუსუდან შუბითიძე[1], ეთერ ყიფიანი[2]

თბილისის სახელმწიფო სამედიცინო უნივერსიტეტი
[1]საზოგადოებრივი ჯანდაცვის ფაკულტეტის სტუდენტი; [2]ხელმძღვანელი, საზოგადოებრივი ჯანმრთელობის ეროვნული ცენტრის პროგრამების მართვის სამმართველოს ხელმძღვანელი

2012 წელს GLOBOCAN-ის მიერ გამოქვეყნებული სარძევე ჯირკვლის კიბოს ასაკ-სტანდარტიზირებული ავადობის მაჩვენებლების დინამიკის შეფასება გვიჩვენებს, რომ ევროპისა და აზიის ბევრ ქვეყანაში სარძევე ჯირვლის ინციდენტობა ზრდის ტენდენციით ხასიათდება, ხოლო ავსტრალიაში, კანადასა და აშშ-ში ინციდენტობა შემცირდა, რაც შეეხება ასაკ-სტანდარტიზეცული სიკვდილიანობის მაჩვენებელი კლების ტენდენციით ხასიათდება, რაც დაკავშირებულია სკრინინგული პროგრამების დანერგვასთან. საქართველოში ქალთა შორის კიბოს ყველაზე გავრცელებულ ლოკალიზაციად სარძევე ჯირკვლის კიბოა მიჩნეული. მის ჩამოყალიბებას ხელს უწყობს რადიაციული დასხივების ზონაში ცხოვრება, ცხოვრების არაჯანსაღი წესი, მემკვიდრული წინასწარგანწყობა, ორსულობა და მშობიარობა 30 წლის ასაკის შემდგომ, ჭარბი წონა და გინეკოლოგიური პრობლემები. 2015 წელს სარძევე ჯირკვლის კიბოს ახალი შემთხვევების რაოდენობა 1838 შეადგენს. მისი წილი ქალებში რეგისტრირებული ლოკალიზაციის ახალი შემთხვევების საერთო რაოდენობაში კი 34,4%-ია. ავადობის მაჩვენებელი 100 000 ქალზე 94,7. ახალი შემთხვევების რაოდენობა პრევალირებს 50-70 წლამდე ასაკობრივ ჯგუფში. რეგისტრის მონაცემების მიხედვით სარძევე ჯირკვლის კიბოს ახალი შემთხვევების მხოლოდ 52,2%- ია გამოვლენილი I და II სტადიაში, III სტადიაში 25,9%, IV- ში კი 14,1%, უცნობია -8,1%. 2011 წლიდან საქართველოში მოქმედებს სარძევე ჯირკვლის კიბოს სკრინინგის სახელმწიფო პროგრამა, რომელიც ითვალისწინებს 40-70 წლის ქალების გამოკვლებას. მიზნობრივი ასაკობრივი ჯგუფებიდან 2015 წელს გამოკვლევა ჩაიტარა 10,4%. კიბოს სკრინინგის პროგრამის ფარგლებში 2015 წელს ჩატარებული გამოკვლევების რაოდენობა წინა წლებთან შედარებით მცირედით გაზრდილია.

საკვანძო სიტყვები: *სარძევე ჯირკვლის კიბო, ავადობა, სიკვდილიანობა, ასაკ-სტანდარტიზირებული ავადობის მაჩვენებელი, ასაკ-სტანდარტიზირებული სიკვდილიანობის მაჩვენებელი, რადიაციული დასხივების ზონა, სკრინინგი.*

Cholangiocarcinoma: New Insights

Davit Tophuria[1], Maia Matoshvili[2], Nino Adamia[3].

Tbilisi State Medical University
Departments: Human Normal Anatomy[1], Dermatology and Venereology[2], Pediatrics[3],
[1]Supervisor MD, PhD, Associate Professor; [2]MD, PhD, Assistant Professor; [3]MD, PhD, Assistant Professor

Background**:**Cholangiocarcinoma is a malignant neoplasm originating from biliary epithelial cells. The incidence and mortality of disease are rising in the world. Currently, cholangiocarcinoma is accepted as stem cell disease. There are many risk factors for cholangiocarcinoma. Diagnosis of disease is easy but therapy of disease is quite difficult. Surgical resection and liver transplantation are the best therapies for the disease. Treatment is usually divided in 3 main groups: 1) endobiliarytreatments 2) limited pharmacotherapy and 3) surgical treatment. In hilarcholangiocarcinoma; as curative therapy: 1) local excision 2) combined partial hepatectomy 3) ex situ vivo liver resection and autotransplantation 4) orthotropic liver transplantation 5) central lobe resection 6) neoadjuvant/adjuvant therapies may be given. As palliative therapy; 1) palliative surgical treatment 2) endoscopic stent 3) percutaneous stent 4) photodynamic treatment 5) intraluminal brachytherapy 6) external radiation and systemic chemotherapy may be administered. In conclusion, cholangiocellular carcinoma is a malignant disease which is suggested to be a stem cell disease triggered by inflammation, environmental and genetic factors. It originates from bile ducts and has a poor diagnosis. Future advances in the etiopathogenesisof the disease will contribute to a better understanding of the condition and its better treatment.

Keywords: *Cholangiocarcinoma, Stem cell disease, Therapy*

Acute Myocardial Infarction - Epidemiology, Risk Factors and Management

Akaki Kapanadze

The University of Georgia, School of Health Sciences and Public Health
MA Student, Public Health and Health Care Policy

Acute myocardial infarction has traditionally been divided into ST elevation or non-ST elevation myocardial infarction; however, therapies are similar between the two, and the overall management of acute myocardial infarction can be reviewed for simplicity. Acute myocardial infarction remains a leading cause of morbidity and mortality worldwide, despite substantial improvements in prognosis over the past decade. The majority of cardiovascular disease (CVD) is caused by risk factors that can be controlled, treated or modified, such as high blood pressure, cholesterol, overweight/ obesity, tobacco use, lack of physical activity and diabetes. However, there are also some major CVD risk factors that cannot be controlled. In terms of attributable deaths, the leading CVD risk factor is raised blood pressure (to which 13 % of global deaths is attributed), followed by tobacco use (9%), raised blood glucose (6 per cent), physical inactivity (6 %) and overweight and obesity (5 %). In the European Union, death rates related to CAD dropped by almost 30% between the mid 1960s to the mid and late 1990s; however, within Eastern European countries, there was an increase in death rates related to acute MI in the early 1990s, followed by a subsequent decline. In the Russian Federation, cardiovascular mortality remained the same. The incidence of coronary artery disease (CAD) and related mortality is expected to rise dramatically in other developing countries including India, Latin America, the Middle East and Sub-Saharan Africa, with an estimated 80% increase, from approximately 9 million in 1990 to a projected 20 million by 2020. It is believed that these international trends in the incidence of CAD and subsequent acute MI are largely related to consequences of social and economic changes in these countries, resulting in better healthcare access and increases in life expectancy, in addition to adoption of westernized diets, reduction in physical activity, and higher rates of smoking. The progress is a result of several major trends, including improvements in risk stratification, more widespread use of an invasive strategy, implementation of care delivery systems prioritising immediate revascularization through percutaneous coronary intervention (or fibrinolysis), advances in antiplatelet agents and anticoagulants, and greater use of secondary prevention strategies such as statins.

Abbreviations: *CVD-cardiovascular disease, CAD- coronary artery disease.*

Key Words: *Acute Myocardial Infarction, Risk Factors, Management*

პირველადი ჯანდაცვის როლი დედათა და ბავშვთა ჯანმრთელობის დაცვის საქმეში

ნანა ჯინჭარაძე[1], ნატა ყაზახაშვილი[2]

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა, [1]დოქტორანტი, საზოგადოებრივი ჯანდაცვა; [2]ხელმძღვანელი, მედიცინის აკადემიური დოქტორი, ასოცირებული პროფესორი

ჯანდაცვის მსოფლიო ორგანიზაციის 2008 წლის ანგარიში მთლიანად ეძღვნებოდა პირველად ჯანდაცვას და მის განსაკუთრებულ როლს გლობალური ეკონომიკური კრიზისის პირობებში. ამ ანგარიშის მიხედვით, მეტად მნიშვნელოვანია ქვეყნებმა უზრუნველყონ პირველადი ჯანდაცვის სერვისების უნივერსალური ხელმისწვდომობა. ამ პროცესს დიდი მნიშვნელობა ენიჭება ჯანდაცვის სფეროში თანასწორუფლებიანობისა და სოციალური სამართლიანობის უზრუნველსაყოფად (Toralf Hasvold Professor MD, PhD Primary Health Care Activity Monitor for Europe "PHAMEU"). ჯანდაცვის მსოფლიო ორგანიზაციის გლობალური ჯანმრთელობის 16 ძირითად პროგრამაში დედათა და ბავშვთა ჯანმრთელობის დაცვის პროგრამებს წამყვანი ადგილი უჭირავს. საზოგადოებრივი ჯანდაცვის სპეციალისტების მიერ გაწეული დიდი შრომის მიუხედავად სრულად ვერ იქნა მიღებული ის შედეგები, რომელსაც საზოგადოება ათასწლეულის განვითარების მიზნების განხორციელების შემდეგ მოელოდა. 1990 წლიდან დღემდე მსოფლიოს მრავალ ქვეყანაში დედათა და ბავშვთა სიკვდილიანობა შემცირდა, მაგრამ არა 2/3-ით, როგორც ეს ნავარაუდევი იყო. აღნიშნულის გამო დედათა და ბავშვთა ჯანმრთელობის გაუმჯობესება კვლავ აქტუალურ საკითხად რჩება. დედათა და ბავშვთა ჯანმრთელობის დაცვის საქმეში პირველადი ჯანდაცვის სისტემის როლის შეფასების მიზნით დაწყებულ იქნა სტატისტიკურ მონაცემთა კვლევა. საქართველოში 2000 წელს ორსულთა რაოდენობა იყო - 60779, 2014 – 89725; 2000 წ ორსულობა ბოლომდე მიიტანა 85,42%-მა, 2014 წ- 90,3%; ანტენატალური მეთვალყურეობისთვის ჰჯდ დაწესებულებებს დროულად მიმართა 2000 წ- 52,2%-მა, 2014 წ - 78,3%-მა; 2000 წ ანტენატალური 4 სრული ვიზიტი შეასრულა ორსულთა 61,1%-მა; 2014 წელს 86,9%-მა. 2000 წელს 47191-მა ქალმა იმშობიარა, 2014 წელს 60126-მა. 2000 წელს დროულად იმშობიარა დედათა 96,6%-მა, 2014 – 96,2%-მა. 2000 წელს ფიზიოლოგიურად იმშობიარა დედათა 78,6%-მა, 2014 წელს - 57,0%-მა. პათოლოგიური მშობიარობა 2000 წ აღირიცხა 21,4%; 2014 წ - 43,0%; კვალიფიციური სამედიცინო პერსონალის მიერ მიღებული მშობიარობის რაოდენობა 2000 წ - 95,7%, 2014 წ - 99,9%; ბინაზე მშობიარობის ხვედრითი წილი 2000 წ - 4,3%; 2014 – 0,1%; დედათა სიკვდილიანობის მაჩვენებელი 100000 ცოცხალშობილზე 2000 წ - 49,2 ხოლო 2014 წ - 31,5; მკვდრადშობადობა 1000 დაბადებულზე 2000 წ - 17,6; 2014 – 10,5; პერინატალური სიკვდილიანობა 1000 დაბადებულზე: 2000 წ - 29,6; 2014 – 13,8; 0-1 წლამდე ასაკს ბავშვთა სიკვდილობის მაჩვენებელი 1000 ცოცხალშობილზე 2000 წ - 21,1; 2014 - 8,2; ზემოაღნიშნული მონაცემების მიხედვით შესაძლებელია ცალკე გამოიყოს ის მონაცემები, რომელთა გაუარესება ან გაუმჯობესება პირველადი ჯანდაცვის აქტიურ მუშაობაზეა დამოკიდებული, შესაბამისად დედათა და ბავშვთა ჯანმრთელობის გამოსავალზე სხვა ფაქტორებთან ერთად პასუხისმგებლობა ნაწილობრივ პირველად ჯანდაცვას ეკისრება(ორსულთა გამოვლენა და აღრიცხვაზე დროულად აყვანა, ანტენატალური მეთვალყურეობის 4 სრული ვიზიტით მოცვა, ბინაზე მშობიარობათა რაოდენობის შემცირება, ფიზიოლოგიური მშობიარობა, პერინატალური სიკვდილიანობა, მკვდრადშობადობა, ბუნებრივ კვებაზე მყოფ ბავშვთა რაოდენობა, ეროვნული კალენდრით გათვალისწინებული აცრებით ვაქცინირებულ ბავშვთა რაოდენობა, ბავშვთა ავადობის რაოდენობა ისეთი დაავადებებით, რომელთა თავიდან აცილება შესაძლებელი იყო და სხვ). ჯანდაცვაზე გაწეული დანახარჯების, ასევე ბავშვთა ჯანმრთელობის მდგომარეობის ამსახველი მონაცემების წინასწარი გაანალიზების საფუძველზე შეიძლება ითქვას, რომ ჰჯდ მუშაობა ვერ პასუხობს თანამედროვე გამოწვევებს, ხოლო დედათა და ბავშვთა ჯანმრთელობის მაჩვენებლები სასურველისაგან ჯერ კიდევ შორსაა. კვლევა აღნიშნული მიმართულებით გრძელდება.

***საკვანძო სიტყვები**: დედა, ბავშვი, სიკვდილიანობა, ანტენატალური მეთვალყურეობა, მკვდრადშობადობა, პერინატალური სიკვდილიანობა, დედათა სიკვდილიანობა, მშობიარობა.*

მკვდრადშობადობის სიხშირე, რისკები და მათი მართვა

ივანე ბურჯანაძე[1], ელზა ნიკოლეიშვილი[2]

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
[1]ბაკალავრი, ჯანდაცვის ადმინისტრირება; [2]ხელმძღვანელი, მედიცინის აკადემიური დოქტორი, პროფესორი

განხილულ იქნა საქართველოში ბოლო ათი წლის განმავლობაში მკვდრადშობადობის მაჩვენებელი, რომლის თანახმადაც მკვდრადშობადობა მნიშვნელოვნად შემცირდა, თუმცა განვითარებულ ქვეყნებთან შედარებით მაღალი რჩება. მკვდრადშობადობის მიზეზების შესწავლა კვლავ გამოწვევად რჩება. 2015 წელს NCDC-ს თანახმად, დაფიქსირდა მკვდრადშობადობის 589 შემთხვევა და მკვდრადშობადობის მაჩვენებელმა 1000 დაბადებულზე 9.8 შეადგინა. 2006 წელთან შედარებით, 2015 წელს ქვეყანაში მკვდრადშობადობის მაჩვენებელი 1000 დაბადებულზე 17-დან 10-მდე შემცირდა. შრომის, ჯანმრთელობის და სოციალური დაცვის სამინისტროს და დაავადებათა კონტროლის ცენტრის ერთობლივი აქტივობების შედეგად მოხდა მკვდრადშობადობის შემთხვევათა გადამოწმება და შეჯერება, და ასევე ისტორიების შესწავლა. სამედიცინო ჩანაწერების თანახმად, მკვდრადშობადობის 82% მოხდა ანტენატალურ პერიოდში, 14% ინტრანატალურ პერიოდში, ხოლო 4%-ში ნაყოფის გარდაცვალების დროის დადგენა სამედიცინო დოკუმენტაციის მიხედვით ვერ მოხერხდა. ანტენატალურ პერიოდში მკვდრადშობილთა შორის 31% დაფიქსირებულ იქნა ორსულობის 22-27 კვირის ვადაზე, 27% - ორსულობის 28-33 კვირაზე, 13% და 29%
შესაბამისად - 34-36 და 37-41 კვირის ორსულობის ვადაზე. ინტრანატალურ პერიოდში გარდაცვლილ ნაყოფთა (14%) შორის, შემთხვევათა 64% დაფიქსირდა ორსულობის 22-27 კვირის ვადაზე, 16% - ორსულობის 28-33 კვირის ვადაზე, ხოლო მკვდრადშობადობის 6% და 14% შესაბამისად დადგა ორსულობის 34-36 და ≥37 კვირის ვადაზე. გესტაციური ასაკის (≥37) მკვდრადშობილთა წონა დაბადებისას იყო 2400 გრამზე მეტი.

აბრევიატურა: *NCDC- საქართველოს შრომის, ჯანმრთელობის და სოციალური დაცვის სამინისტრო და დაავადებათა კონტროლისა და საზოგადოებრივი ჯანმრთელობის ეროვნული ცენტრი.*

დედათა და ბავშვთა სიკვდილიანობა

ირინა კანდელაკი

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
სტუდენტი ბაკალავრი, ჯანდაცვის ადმინისტრირება

საქართველოში ბავშვთა ავადობა და სიკვდილიანობა მეტწილად თავიდან აცილებადია. ხუთ წლამდე ასაკის ბავშვთა სიკვდილიანობის ძირითადი მიზეზებია: ნეონატალური პერიოდის მდგომარეობები, პნევმონია, დიარეა და განვითარების თანდაყოლილი მანკები. ბევრ შემთხვევაში სიკვდილიანობა კვების ნაკლებობასაც უკავშირდება. ამასთანავე, ბავშვებს შემდეგი რისკებიც ემუქრებათ: მავნე გარემო, სიმსუქნე და ცხოვრების არაჯანსაღი წესი. ბავშვთა სიკვდილიანობის უმეტესი შემთხვევები დაბადებიდან 28 დღის განმავლობაში ხდება. ეს ძირითადად, გამოწვეულია: დღენაკლულობით, ასფიქსიით და ინფექციებით/ პნევმონიით, რაც მთლიანობაში ახალშობილთა სიკვდილიანობის მიზეზების სამ მეოთხედს შეადგენს. აღნიშნული მიზეზები მჭიდრო კავშირშია დედის ჯანმრთელობის მდგომარეობასთან ფეხმძიმობის პერიოდში, მშობიარობის გარემოებებთან და მშობიარობის შემდეგ პირველ რამდენიმე კრიტიკულ საათთან. მოსახლეობის დაახლოებით 50% პირდაპირ საავადმყოფოებს მიმართავს, პირველადი ჯანდაცვის სისტემის გვერდის ავლით, რაც ამ სისტემას ფაქტიურად, უფუნქციოს ხდის. სამედიცინო მომსახურების საფასური ხშირად ძალიან მაღალია და მნიშვნელოვან დაბრკოლებას უქმნის მის ხელმისაწვდომობას (საქართველოში თვითდაფინანსების წილის ერთ-ერთი ყველაზე მაღალი მაჩვენებელი ფიქსირდება რეგიონში – ჯანდაცვის მთლიანი ხარჯის 73%). სახელმწიფოს მიერ დაფინანსებულმა ჯანმრთელობის დაზღვევის პროგრამამ სოციალურად დაუცველი ოჯახებისათვის დადებითი შედეგები მოუტანა ღარიბ ოჯახებს, რომლებზეც გავრცელდა აღნიშნული დაზღვევა. 2008 წელს ბავშვის უფლებათა კომიტეტი ძალზე შეშფოთებულია ახალშობილთა სიკვდილიანობისა და დღენაკლული ბავშვების დაბადების მაღალი მაჩვენებლით, ასევე პრენატალური და პოსტნატალური ჯანდაცვის ზოგადი მდგომარეობით, განსაკუთრებით უმცირესობათა ჯგუფებში. მნიშვნელოვანი პროგრესი იქნა მიღწეული ბავშვთა სიკვდილიანობის შემცირების საქმეში. 1999 წლიდან ხუთ წლამდე ასაკის ბავშვების სიკვდილიანობის მაჩვენებელი შემცირდა ორი მესამედით, ე.ი. 1000 ცოცხლად შობილიდან 45 ლეტალური გამოსავალი 16-მდე დაეცა 2010 წელს. ამავე პერიოდში ჩვილ ბავშვთა სიკვდილიანობამ იკლო 42–დან 14 შემთხვევამდე 1000 ცოცხლად შობილიდან. 2009 წელს 61,677 ცოცხლად შობილიდან ახალშობილთა 94%-ს დაბადებისას ნორმალური წონა ჰქონდა (2,499 გრამზე მეტი), ხოლო საავადმყოფოში რეგისტრირებული ცოცხლად შობილი ბავშვების 9% ავადმყოფი დაიბადა, ან დაავადდა დაბადების შემდეგ. ეს რაოდენობა მოიცავს გარკვეულ მდგომარეობებს, რომლებიც პერინატალურ პერიოდში წარმოიშვა (92%) და თანდაყოლილ ანომალიებს (7%). ბავშვთა ჯანმრთელობასთან დაკავშირებული სხვა ძირითადი პროცესები და შედეგების ინდიკატორები განხილულია წინამდებარე ანგარიშის შემდეგ თავებში: „იმუნიზაცია“, „კვება“ და „დედათა ჯანმრთელობა“.

საკვანძო სიტყვები: *დედათა და ბავშვთა სიკვდილიანობა.*

აბორტებისა და საკეისრო კვეთების სიხშირე, რისკები და მათი მართვა

ეკა კობალაძე[1], თინათინ სამხარაძე[2]

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
[1]სტუდენტი ბაკალავრი, ჯანდაცვის ადმინისტრირება; [1]სტუდენტი ბაკალავრი, ჯანდაცვის ადმინისტრირება

2015 წლის 16 აპრილს IDFI-მ საქართველოს შრომის, ჯანმრთელობისა და სოციალური დაცვის სამინისტროდან მიიღო ინფორმაცია 2013-2014 წლებში საქართველოში ჩატარებული აბორტების რაოდენობის შესახებ. ეს მაჩვენებლები საშუალებას გვაძლევს წარმოგიდგინოთ 2004-2014 წლებში საქართველოში ორსულობის შეწყვეტის ფაქტების ტენდენციები. 2013 წელს გამოქვეყნებულმა სტატიამ „აბორტების სტატისტიკა საქართველოში 2004-2012 წლებში“ ნათლად აჩვენა,რომ საქართველოში 2012 წლამდე ყოველწლიურად შეინიშნებოდა აბორტების რაოდენობის მზარდი ტენდენცია. 2012 წელს ოფიციალურად ორსულობის შეწყვეტის 39 225 ფაქტი დაფიქსირდა, როგორც მიღებული დოკუმენტაციით ირკვევა მომდევნო წლებში გარკვეულწილად აბორტების კლებადი ტენდენცია ფიქსირდება.2013 წელს აღნიშნული 36 537 შემთხვევამდე შემცირდა, ხოლო 2014 წელს წინასწარი მონაცემებით 31 908 შემთხვევა არის დაფიქსირებული. 2004-2012 წლებში ყოველწლიურად შეინიშნებოდა, როგორც ხელოვნური, ასევე თვითნებური (თავისთავადი) აბორტების შემთხვევის ზრდა. მისასალმებელია ის ფაქტი,რომ 2013-2014 წლის წინასწარი მონაცემების მიხედვით ხელოვნური აბორტების შემთხვევების რაოდენობა ყოველწლიურად 4000 შემთხვევით კლებელობს.რაც შეეხება თვითნებურ (თავისთავად) აბორტებს სამწუხაროდ ბოლო წლებშიც კვლავ მზარდი ტენდენცია შეინიშნება და 2014 წელს წინასწარი მონაცემებით ბოლო 10 წლის განმავლობაში ყველაზე ბევრი 5895 შემთხვევა ფიქსირდება. მნიშვნელოვანია მონაცემები,თუ როგორ გადანაწილდა აბორტები ასაკობრივი ჯგუფების მიხედვით,როგორც ირკვევა ორსულობის შეწყვეტის შემთხვევები 15 წლამდე მოზარდების ასაკობრივ კატეგორიაში 2013 და 2014 წლებშიც არის დაფიქსირებული.2013 წელს 15 წლამდე მოზარდებში აბორტის 32 შემთხვევა დაფიქსირდა (მათ შორის 8 ხელოვნური),ხოლო 2014 წლის მონაცემებით 17 შემთხვევა (9 ხელოვნური). განვლილი წლების მსგავსად 2014 წლის მონაცემებით აბორტების ყველაზე დიდი წილი 44%(სულ 13961,მათ შორის ხელოვნური -12779) მოდის 20-29 წლამდე ასაკის ჯგუფზე. აბორტების შემცირება შესაძლებელია შემდეგი ღონისძიებების გატარებით: ჯანდაცვის ხელმისაწვდომობით, მშობიარეთა დაფინანსება სახელმწიფოს მხრიდან, ორსულთა უზრუნველყოფა საჭირო მედიკამენტებით, დეკრეტული შვებულების გაზრდა და სხვ. 1985 წელს ჯანდაცვის მსოფლიო ორგანიზაციის მიერ მიღებული რეკომენდაციით,საკეისრო კვეთების რაოდენობა ქვეყნის მასშტაბით მშობიარეთა საერთო რიცხვი 10-15% არ უნდა აღემატებოდეს. საქართველო იმ ქვეყნების ჩამონათვალს მიეკუთვნება, რომელშიც საკეისრო კვეთის სიხშირე, ჯანმოს მიერ რეკომენდირებულ 15% -იან ზღვარს, საკმაოდ მაღალი ციფრებით სცილდება და სტაბილურად განაგრძობს ზრდას. ქვეყანაში საკეისრო კვეთის საშუალო მაჩვენებელმა 2013 წელს 37,3%-ი შეადგინა. სტატისტიკური მონაცემების მიხევით, საქართველოს რეგიონებს შორის საკეისრო კვეთების მხრივ გამოირჩევიან:სამეგრელო- ზემო სვანეთი (51%), აჭარა (40,6%), იმერეთი (41,8%). საკეისრო კვეთების დაბალი მაჩვენებელია სამცხე-ჯავახეთში (10,1%), რაჭა-ლეჩხუმში და ქვემო სვანეთში 48 მშობიარედან არცერთი საკეისრო კვეთა არ დაფექსირებულა. საკეისრო კვეთების რაოდენობის ზრდა დედათა და ბავშვთა ავადობისა და სიკვდილობის მაღალ მაჩვენებელთან ასოცირდება.ამასთან, იგი მნიშვნელოვნად ზრდის დანახარჯებს. საკეისრო კვეთების შემცირებაში მნიშვნელოვანია სახელმწიფოს როლი. ამ მხრივ, სახელმწიფო რეგულაციის უმთავრესი მექანიზმია საკეისრო კვეთის ეროვნული პოლიტიკისა და გაიდლაინის შექმნა.

აბრევიატურა: *IDFI- ინფორმაციის განვითარების თავისუფლების ინსტიტუტი*
საკვანძო სიტყვები: *აბორტები, საკეისრო კვეთები, რისკები, მართვა*

დედათა სიკვდილიანობა საქართველოში, გამომწვევი მიზეზები, რისკები და მათი მართვა

ლაშა ხვედელიძე[1], ვასილ ტყეშელაშვილი[2]

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
[1]სტუდენტი ბაკალავრი, ჯანდაცვის ადმინისტრირება; 2ხელმძღვანელი, მედიცინის მეცნიერებათა დოქტორი, პროფესორი

დედის სიკვდილი არის ქალის ორსულობით განპირობებული სიკვდილი, რომელიც მოხდა ორსულობის პერიოდში ან მისი დამთავრებიდან 42 დღის შემდეგ, ორსულობასთან დაკავშირებული რომელიმე მიზეზით, რომელიც დამძიმდა ორსულობის, მშობიარობის ან ლოგინობის პერიოდში, მაგრამ არა უბედური შემთხვევითან შემთვევითი მიზეზებით (WHO). ათწლეულის განვითარების მიზანთაგან ერთ-ერთს წარმოადგენს უნივერსალური ხელმისაწვდომობა რეპროდუქციული ჯანმრთელობის სერვისებზე, ხოლო ამ მიზნის ერთ-ერთი ამოცანაა დედათა სიკვდილიანობის შემცირება. 2014 წლის Ramos[3] კვლევამ აჩვენა, რომ საქართველოში დედათა სიკვდილიანობის მაჩვენებელი 2006 წლიდან 2012 წლამდე შემცირდა 44.4 შემთხვევიდან 26.3 შემთხვევამდე ყოველ 100,000 ცოცხალშობილზე. ასევე, 2014 წლის Ramos[3] კვლევამ აჩვენა, რომ კიბო ჯერ კიდევ წარმოადგენს რეპროდუქციული ასაკის ქალთა გარდაცვალების წამყვან მიზეზს და კიბოთი გამოწვეული სიკვდილიანობა შეადგენს მათი საერთო სიკვდილიანობის 45.3 % -ს. 2014 წლის კვლევამ აჩვენა , რომ ძუძუს კიბო იყო რეპროდუქციული ასაკის ქალთა გარდაცვალების ერთადერთი წამყვანი მიზეზი (12,6%) , რასაც მოყვება ავტოსაგზაო შემთხვევები (9,3%) და საშვილოსნოს ყელის კიბო (6,5%). რაც შეეხება პირდაპირ სამეანო სიკვდილიანობის ძირითად მიზეზებს : ინფექცია (21,7%) და სამეანო სისხლდენა (17,4%) , ხოლო არაპირდაპირი მიზეზით გამოწვეულია სამეანო სიკვდილიანობის 26,1 %. აღსანიშნავია, რომ მსოფლიოში 358,000 მეტი ადამიანი კვდება ორსულობის ან მშობიარობის შემდეგ (WHO გლობალური მონაცემები) , საქართველოში დედათა სიკვდილიანობის მაჩვენებელი 2013 წლის მონაცემებით 41 შეადენს (NCDC).

აბრევიატურა : *WHO- ჯანმრთელობის მსოფლიო ორგანიზაცია; NCDC- დაავადებათა კონტროლისა და საზოგადოებრივი ჯანდაცვის ეროვნული ცენტრი.; Ramos -ქვეყანაში დედათა სიკვდელიანობის მაჩვენებლების,მიზეზებისა და გამომწვევი ფაქტორების დადგენისა და დედათა სიკვდილიანობის რეგისტრაციის ხარისხის შეფასების ინსტრუმენტი.*

საკვანძო სიტყვები: *დედათა სიკვდილიანობა საქართველოში, გამომწვევი მიზეზები, რისკები და მათი მართვა*

როგორ შეიცვალა საქართველოს დემოგრაფიული მაჩვენებლები

დეა ბაღათურია

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
სტუდენტი ბაკალავრი, ჯანდაცვის ადმინისტრირება

2008 წლის შემდეგ დაბადებულთა საერთო რიცხოვნობაში მესამე და მომდევნო შვილების წილი გაიზარდა. პირველი შვილის წილი შემცირდა. ხოლო მეორე შვილის წილი თითქმის უცვლელი დარჩა. საქსტატის ცნობით, ეს 2016 წელსაც გაგრძელდა და წინა წელთან შედარებით მესამე და მომდევნო შვილის წილი 1,2 პროცენტული პუნქტით გაიზარდა. რაც შეეხება დაბადებულთა რიცხოვნობას, 2016 წელს ცოცხლად დაბადებულთა რაოდენობამ 56 569 შეადგინა, მათ შორის 28 887 ბიჭი და 27 682 გოგო დაიბადა, რაც "საქსტატის" ინფორმაციით, 4,5 პროცენტით ნაკლებია, რადგან ცოცხლად დაბადებულთა რაოდენობა 2015 წელს სრულად არის 6 249. გარდაცვლილთა რიცხოვნობა 2016 წელს, 2015 წელთან შედარებით 3,4 პროცენტით გაიზარდა და 50 771 შეადგინა. საქსტატმა ქორწინებისა და განქორწინებების გასული წლის სტატისტიკაც გამოაქვეყნა. ოფიციალური მონაცემებით, 2016 წელს 9 539 წყვილი განქორწინდა, რაც 427-ით მეტია 2015 წელთან შედარებით. განქორწინების ყველაზე მეტი წილი 3 064 ერთეული იმ წყვილებზე მოდის, რომელთაც ქორწინებაში დაახლოებით 4 წელი გაატარეს, მას მოსდევს 2 296 ერთეულით 20 და მეტი ხანგრძლივობის ქორწინების მქონე წყვილთა განქორწინება, 2 274 განქორწინება დაფიქსირდა 5-დან 9 წლამდე ქორწინებაში მყოფ წყვილებზე. 2016 წელს განქორწინებული წყვილების უმრავლესობა პირველ ქორწინებაში იმყოფებოდა. "საქსტატის" ცნობით, 2016 წელს რეგისტრირებული განქორწინებების ყველაზე დიდი რაოდენობა 3 688 ერთეული თბილისზე მოდის, 2015 წელთან შედარებით ეს მაჩვენებლი 87 ერთეულით გაიზარდა. გასულ წელს 1 450 რეგისტრირებული განქორწინება დაფიქსირდა იმერეთში, 982 კი ქვემო ქართლში. ყველაზე ცოტა 56 განქორწინება რაჭა-ლეჩხუმსა და ქვემო სვანეთში დარეგისტრირდა. რაც შეეხება ქორწინებებს, გასულ წელს საქართველოში 25 101 ადამიანი დაქორწინდა და 2015 წელთან შედარებით ქორწინების რიცხვმა 4 056 ერთეულით დაიკლო. საქსტატის ცნობით, ყველაზე მეტი ქორწინება 20-24 და 25-29 წლის ახალგაზრდებზე მოდის. აღსანიშნავია, რომ 20-დან 24 წლამდე 7 978 ქალი, ხოლო 25-დან 29 წლამდე 7 174 კაცი დაქორწინდა. საქსტატის მონაცემებით, 2016 წელს ყველაზე მეტი 7 304 ქორწინება თბილისში დარეგისტრირდა, თუმცა ეს რიცხვი 2015 წლის მონაცემზე (8 249 ქორწინება) 945 ერთეულით ნაკლებია. 3 832 ქორწინება დარეგისტრირდა იმერეთში, 2 631 კი აჭარაში. 2016 წელს ყველაზე ცოტა, 203 ქორწინების რეგისტრაცია რაჭა-ლეჩხუმსა და ქვემო სვანეთში დაფიქსირდა.

საკვანძო სიტყვები: *საქართველო, დემოგრაფიული მაჩვენებლები*

აივ შიდსი და მისი მკურნალობის ეთიკური ასპექტები

[1]ცეცხლაძე ვერონიკა, [2]ნატა ყაზახაშვილი

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
[1]სტუდენტი ბაკალავრი, ჯანდაცვის ადმინისტრირება; [2]ხელმძღვანელი, მედიცინის აკადემიური დოქტორი, ასოცირებული პროფესორი

აივ შიდსი ერთ-ერთი ყველაზე გავრცელებული დაავადებაა. ის მედიცინის ერთ-ერთ უმწვავეს პრობლემას წარმოდგენს. შიდსი ნელა პროგრესირებადი ინფექციური დაავადებაა, მას იწვევს ადამიანის იმუნოდეფიციტის სინდრომი (აივ), რომელიც ორგანიზმში შეჭრის შემდეგ აზიანებს ადამიანის იმუნურ სისტემას და მწყობრიდან გამოჰყავს ის. აივ მიეკუთვნება რეტროვირუსების ოჯახს. მისი სამიზნე უჯრედებია ლიმფოციტები, მონოციტ/მაკროფაგები, ფოლიკულურ-დენდრიტული უჯრედები. განსხვავებენ აივ ინფექციის სამ მიმდინაეობას: 1.ტიპიური მიმდინარეობა-ინფიცირებულთა 80-90 %, სიცოცხლის საშუალო ხანგრძლივობა 10 წელია. 2.სწრაფად პროგრესირებადი-ინფიცირებულთა 10-15 %,და დაავადება 3-4წელიწადში პროგრესირებს.3.ხანგრძლივად არაპროგრესირებადი-ინფიცირებულები, რომელთა დაავადება ხანგრძლივი დროის მანძილზე 10-15 წელი არ გადადის შიდსში.დაავადების სიმპტომებს მიეკუთვნება: ლიმფადენოპათია, სისუსტე, ფაღარათი, წითელი ფერის გამონაყარი კანსა და ლორწოვან გარსებზე, ნერვული სისტემის დაზიანება. შიდსის განვითარების რისკ-ფაქტორებია - ნარკოტიკის გამოყენება, ჰეტერო/ჰომო სექსუალური კონტაქტები, აივ ინფიცირებულის სისხლის გადასხმა, ასევე ის გადადის ორსულობის პერიოდში ,მშობიაროზის ან ძუძუთი კვების დროს დედიდან შვილზე, არასტერილური სამედიცინო ინსტრუმენტების გამოყენება, ტატუირება, პირსინგი. დაავადების დიაგნოსტიკაში გადამწყვეტს წარმოადგენს ლაბორატორიული გამოკვლევა. დიაგნოსტიკის ძირითადი საშუალებებია სისხლში აივ საწინააღმდეგო ანტისხეულების და ვირუსის გენეტიკური მასალის განსაზღვრა. მკურნალობის დროს მიმართავენ ანტირეტროვირუსულ, ოპორტუნისტული ინფექციებისა და სიმსივნეების მკურნალობას და იმუნორეაბილიტაციას. აივ სკრინინგი ხორციელდება (ELISA) მეთოდით, რათა ამოიცნონ სისხლში არსებობს თუ არა ანტისხეულები აივის წინააღმდეგ, ასევე დიაგნოსტიკისთვის გამოიყენება WESTERN BLOT-ის ანალიზი, რომელიც ამოიცნობს სპეციფიურ ცილებს მოცემულ ქსოვილში ან უჯრედებში. დიაგნოზის დასაზუსტებლად იყენებენ პოლიმერაზულ ჯაჭვურ რეაქციას (PCR), რომელიც სენსიტუროზით გამოირჩევა.WHO-ს მონაცემებით, შიდსს მსოფლიოში სიკვდილიანობის მიზეზთა შორის მეოთხე ადგილი უკავია.მთლიანად მსოფლიოში აივ ინფიცირებულთა რიცხვი იზრდება. 2003 წლის მონაცემებით 40 მლნ ადამიანია დაინფიცირებული. ყოველდღიურად აღირიცხება 14 000 ახალი შემთვევა. 2005 წელს დაინფიცირდა 4,9 მლნ ადამიანი და გარდაიცვალა 3,1მლნ. საქართველოში 2012 წელს დაინფიცირებულთა რაოდენამ 3641 ს მიაღწია. აივ ინფიცირების დროს წარმოიქმნება ეთიკური პრობლემები. სპეციალისტების მიერ მათ მკურნალობაზე უარის განცხადების ფაქტი ჰიპოკრატეს ექიმის ფიცის დარღვევად უნდა შეფასდეს, რაც გამოწვეულია დასნებოვნების შიშით, დაზღვევის ორგანოები კავშირს არ ამყარებენ და მათზე ზრუნვას მიზანშეუწონლად თვლიან, დაავადებულები საზოგადოებიდან ირიყებიან, დაავადებულთა 50 % მიმართავს ევთანაზიას..ეთიკური ხასიათის სიძნელეები წარმოიშობა ორსული ქალის აბორტის ან მშობიაროზის დროს. აბორტი გამართლებულია, რადგან დამტკიცებულია ნაყოფის დასნებოვნების შესაძლებლობის მაღალი რისკი. ეთიკურ პრობლემებს წარმოშობს დაავადებულთა წამლებით მომარაგების, მათი მოთხოვნების დაკმაყოფილების საკითხის გადაწყვეტის დროს წარმოშობილი სიძნელეები. დგება საკითხი ექიმის მორალური ქცევის შესახებ. აქვს თუ არა ექიმს იმის უფლება, რომ გამოუწეროს „სიკვდილ მისჯილ პაციენტს „წამალი, რომლის შეძენის საშუალება არ აქვს? როგორ უნდა შეფასდეს იმ ექიმის მორალური ქცევა, რომელიც იძულებულია მოახდინოს პაციენტთა დიფერენციაცია, დაავადებულებს აკრძალული აქვთ ოჯახის შექმნა. ამით შელახულია მათი მოქალაქეობრივი უფლებები.

აბრევიატურა: *ELISA-იმუნოფერმენტული ანალიზი, WESTERN BLOT-იმუნობლოტინგი ,PCR-პოლიმერაზული ჯაჭვური რეაქცია. WHO-მსოფლიო ჯანდაცვის ორგანიზაცია.*

საკვანძო სიტყვები: *აივ შიდსი,რეტროვირუსი, ლიმფადენოპათია, პოლიმერაზა, ევთანაზია, აბორტი*

ევთანაზია - მკვლელობა თუ ჰუმანურობა

სალომე ახალაია

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა სტუდენტი ბაკალავრი, ჯანდაცვის ადმინისტრირება

დღესდღეობით მედიცინაში მნიშვნელოვანი განხილვის საგანს წარმოადგენს ევთანაზია. შევეცდები ყველა იმ ადამიანის ადგილას წარმოვიდგინო თავი, ვინც გაუსაძლის ტკივილს გრძნობს და მზადაა მიიღოს ეს საბედისწერო გადაწყვეტილება და შევეცდები ვისაუბრო რელიგიურ, კანონიერ და ჰუმანურ ასპექტებზე ევთანაზიასთან დაკავშრებით. ევთანაზია (მკვლელობა მსხვერპლის თხოვნით) ბერძნული სიტყვაა და შედგება ორი ნაწილისაგან, - ''ეუ'' ნისნავს კარგს, ''თანატოს'' სიკვდილს. ევთანაზია ნიშნავს სასიკვდილო სენით დაავადებული, ავადმყოფობის უკანასკნელ სტადიაზე მყოფი პაციენტებისათვის სიცოცხლის განზრახ მოსწრაფებას, ავადმყოფობით გამოწვეული ძლიერი ტკივილებისა და ტანჯვისგან განთავისუფლების მიზნით. ევთანაზიის ორი სახე არსებობს : პასიური და აქტიური. აქტიური ევთანაზიის დროს, უკურნებადი დაავადების ტერმინალურ სტადიაზე მყოფი ავადმყოფის მიმართ გამოიყენება ისეთი პრეპარატი, რომელიც აჩქარებს სიკვდილს, პასიური ევთანაზიის დროს კი წყდება დამხმარე თერაპია XX საუკუნის პირველ ნახევარში ნაცისტურ გერმანიაში ევთანაზია ხორციელდებოდა მასობრივი მასშტაბით იმათ წინააღმდეგ, ვინც იმ დროისთვის "ეკონომიკურ ტვირთს" წარმოადგენდა, მეცნიერები და ექიმები იმ დროისთვის ე.წ. "რასობრივი ჰიგიენის" პროპაგანდას ეწეოდნენ. მათი გავლენით ჰიტლერმა გამოსცა ბრძანება იმ ბავშვების რეგისტრაციის შესახებ, რომლებიც დაავადებულნი იყვნენ ''მონღოლოიდურობით'', ჰიდროცეფალიით, ცერებრალური დამბლით და სხვა სიმახინჯეებით. ამ კატეგორიას უკეთებდნენ ევთანაზიას ფენობარბიტალის ჭარბი დოზის შეყვანით. ევთანაზია იყო საშულება ''საზოგადოებისათვის ზედმეტი ტვირთის მოსაცილებლად''. სწორედ აღნიშნულზე დაყრდნობით, ევროპის უმეტესი ქვეყანა ერიდება მის ლეგალიზებას, რათა არ მოხდეს ევთანაზიის ბოროტად გამოყენება. პასიური ევთანაზია ლეგალიზებულია. ექიმებს შორის დამკვიდრებულია აზრი, რომ თუკი პაციენტის სიცოცხლე აპარატის გარეშე შეუძლებელია, შესაძლებელია მისი გამორთვა, რადგნაც ხდება უკვე არა პაციენტის სიცოცხლის შენარჩუნება, არამედ სიკვდილის გაჭიანურება. რაც შეეხება აქტიურ ევთანაზიას, იგივე ''ტკივილის მომხსნელ ნემსს'' მასთან დაკავშირებით განსხვავებული აზრი არსებობს. სხვადასხვა ქვეყნის კანონმდებლობა აღნიშნულ საკითხს სხვადასხვაგვარად აგვარებს. ქვეყანათა ერთი ჯგუფი ევთანაზიის ლეგალიზებას ახდენს, მეორე მას ჩვეულებრივ, მარტივ მკვლელობად განიხილავს, ხოლო მესამე ჯგუფი დანაშაულის შემამსუბუქებელ გარემობად მიიჩნევს. საქართველოში პასიუნი ევთანაზია დაშვებულია, რაც შეეხება აქტიურ ევთანაზიას, იგი დანაშაულად ითვლება, თუმცა პრივილეგირებულ დანაშაულთა ჯგუფს მიეკუთნება და დანაშაულის შემამსუბუქებელ გარემობად არის აღიარებული. თუმცა იმისათვის, რომ ქმედება დაკვალიფიცირდეს საქართველოს სისხლის სამართლის კოდექსის 110-ე მუხლით (მკვლელობა მსხვერპლის თხოვნით) აუცილებელია არსებობდეს რამდენიმე პირობა: 1) მსხვერპლის მოთხოვნა უნდა იყოს არაერთჯერადი, იგი დაჟინებით უნდა ''ითხოვდეს სიკვდილს'', ეს უნდა იყოს მისი ნება და მოთხოვნის დროს იგი უნდა იმყოფებოდეს საღ ჭკუაზე, და შეეძლოს გადაწყვეტილების ნათელი გონებით მიღება; 2) ეს უნდა მოხდეს მხოლოდ მხოლოდ მომაკვდავის ძლიერი ფიზიკური ტკივილისაგან გათავისუფლების მიზნით. როგორც ზემოთ აღვნიშნეთ, აქტიურ ევთანაზიას მრავალი მოწინააღმდეგე ყავს, რომელთაც საკმაოდ დამაჯერებელი არგუმენტები მოყავთ თავიანთი პოზიციის გასამტკიცებლად: ერთის მხრივ გამორიცხული არაა ადგილი ქონდეს შეცდომას დიაგნოზში, მედიცინა დღითიდღე ვითარდება და გამორიცხული არ არის დღეს უკურნებადი დაავადება ხვალ განურნებადი გახდეს, და შემი აზრით ყველა მთავარი არგუმენტი - ევთანაზია შეუთავსებელია ექიმის პროფესიულ და საზოგადოებრივ ფუნქციასთან, იმ ნდობის ატმოსფეროსთან, რომელიც უნდა სუფევდეს ექიმსა და პაციენტს შორის.

საკვანძო სიტყვები: *ევთანაზია, მკვლელობა თუ ჰუმანურობა*

ზიანის შემცირების პროგრამების განხორციელების მნიშვნელობა C ჰეპატიტის ელიმინაციის პროგრამის ფარგლებში

მარინა ჩოხელი

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა მაგისტრანტი, საზოგადოებრივი ჯანმრთელობა და ჯანდაცვის პოლიტიკა

საქართველოში C ჰეპატიტი საზოგადოებრივი ჯანდაცვის ერთ-ერთ მწვავე პრობლემას წარმოადგენს. 2015 წელს დაავადებათა კონტროლისა და საზოგადოებრივი ჯანმრთელობის ეროვნული ცენტრისა და აშშ-ის დაავადებათა კონტროლის ცენტრის მიერ ჩატარებული სეროპრევა-ლენტობის პოპულაციური კვლევის მიხედვით (რომელშიც 6,012 მოქალაქე იღებდა მონაწილეობას) ქვეყნის მოსახლეობის 7.7%-ს ჰქონდა HCV ანტისხეულები (ქალაქში მცხოვრები მოსახლეობის 9.4%-ს და სოფლად მცხოვრები მოსახლეობის 5.5%-ს), ხოლო რნმ-პოზიტიური, ანუ C ჰეპატიტის აქტიური ფორმით დაავადებული, მთლიანი მოსახლეობის 5.4% აღმოჩნდა (C ჰეპატიტით დაინფიცირების ასეთი მაღალი მაჩვენებლით საქართველო მსოფლიოში მესამე ადგილს იკავებს ეგვიპტისა და მონღოლეთის შემდეგ). საქართველოში C ჰეპატიტის გადაცემის ერთ -ერთ მთავარ გზას ინექციური ნარკოტიკების მოხმარება წარმოადგენს. ბოლო მონაცემებით ნარკოტიკების ინექციური მომხმარებლების (ნიმ-ების) რაოდენობა დაახლოებით 50,000-ია. 2012 წელს თბილისში ჩატარებულმა კვლევამ ცხადჰყო, რომ ინექციური ნარკოტიკების მომხმარებელთა 92%-ს აღმოაჩნდა HCV-ის ანტისხეულები, ხოლო 82%-ს ვირუსის ქრონიკული ფორმა; მათ შორის გამოკვლეულთა 20%-ს ღვიძლის ფიბროზის მაღალი ხარისხი აღენიშნებოდა (F3 და მეტი ღვიძლის ელასტოგრაფიის შედეგად) (ბუსკაიუ და სხვ., 2014). სტატისტიკიური მონაცემების თანახმად, C ჰეპატიტით ინფიცირებულთა მთლიანი რაოდენობის 19%-დან 25.6%-მდე ინექციური ნარკოტიკების მომხმარებელია (ვიკერმანი, 2015; ლუმანი და სხვ., 2015), ხოლო ვირუსის ახალი შემთხვევების 34% შესაძლოა ნარკოტიკების ინექციურ მოხმარებას უკავშირდებოდეს. საქართველოში ინექციური ნარკოტიკების მოხმარების პოპულაციის ზომის შეფასების კვლევის ანგარიშის (საერთაშორისო ფონდი კურაციო, თბილისი,საქართველო 2014 წ.) თანახმად, 49,700 ნარკოტიკების მომხმარებლიდან დაახლოებით 8,000 საჭიროებს გადაუდებელ მკურნალობას. საგულისხმოა, რომ ინექციური ნარკოტიკების მომხმარებლების წვდომა ზიანის შემცირების სერვისებზე, მიუხედავად ამ სერვისებით მათი მოცვის პროგრესირებადი ხასიათისა, მაინც დაბალ ნიშნულზე რჩება. ბოლო მონაცემებით, ოპიოიდური ჩანაცვლებითი თერაპიით ნიმ-ების დაახლოებით 10%, ხოლო ნემსებისა და შპრიცების პროგრამით - 28%-ია მოცული. საქართველოში C ჰეპატიტის მკურნალობა ხელმისაწვდომი შიდსის, ტუბერკულოზისა და მალარიის წინააღმდეგ ბრძოლის გლობალური ფონდის დახმარებით, 2011 წელს გახდა, აღმოსავლეთ ევროპის რეგიონში პირველად, აივ/შიდსითა და C ჰეპატიტით კოინფიცირებული პაციენტებისთვის. აღნიშნული პროგრამის ფარგლებში, 2015 წლის ოქტომბრის მდგომარეობით, 475 აივ-ინფიცირებულ პაციენტს ჩაუტარდა C ჰეპატიტის უფასო მკურნალობა. 2011 წელს სახელმწიფომ 47 მკურნალობის კურსი შეისყიდა ადამიანის უფლებათა ევროპული სასამართლოს გადაწყვეტილების შედეგად, როცა სასამართლომ რამდენიმე საქმე განიხილა საქართველოს წინააღმდეგ და დაადგინა, რომ ქვეყანამ სასჯელაღსრულების დაწესებულებებში C ჰეპატიტის მკურნალობის უზრუნველყოფა ვერ შესძლო. 2013 წელს, ახალმა მთავრობამ პოლიტიკის დონეზე რეაგირების ფორმულირება დაიწყო HCV ეპიდემიის საკითხის მოსაგვარებლად ქვეყანაში. 2014 წლის მარტში სამკურნალო პროგრამა შემუშავდა და დაიწყო სასჯელაღსრულების დაწესებულებებში, ხოლო 2015 წელს C ჰეპატიტის ელიმინაციის პროგრამა დაიწყო სამოქალაქო სექტორშიც. 2015 წელს მოხდა C ჰეპატიტის ელიმინაციის პროგრამაში ზიანის შემცირების პროგრამების მოცვის ზრდის საჭიროების არტიკულირება. შედეგად, ზიანის შემცირების თავს ელიმინაციის პროგრამაში საკმაოდ მნიშვნელოვანი ნაწილი უჭირავს. თუმცა, ნარკოტიკის მოხმარების დეკრიმინალიზაციის მოთხოვნის შესრულება საჭიროებს მაღალი დონის პოლიტიკურ ნებას. C ჰეპატიტის ელიმინაციის პროგრამა, ითვალისწინებს ზიანის შემცირების პროგრამების მხარდაჭერას: მკურნალობის და პრევენციის ღონისძიებებში ნარკოტიკების ინექციურად მომხმარებელი პირების ჩართვას, ზიანის შემცირების სერვისებსა (ნემსების/შპრიცების პროგრამა (NSP)) და ოპიოიდების ჩანაცვლების თერაპიაზე (OST) ხელმისაწვდომობის გაზრდას.

უსაფრთხოა თუ არა ფტორირებული სასმელი წყალი?

მეგი შარაშენიძე[1], ნინო შარაშენიძე[2]

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
[1]დოქტორანტი, საზოგადოებრივი ჯანდაცვა; [2]სუ და თსუ ლექტორი

მიუხედავად იმისა, რომ ამერიკის შეერთებული შტატების ჯანმრთელობის მართვისა და პრევენციის ეროვნულმა ცენტრმა წყლის ფტორირება დაასახელა მეოცე საუკუნის საზოგადოებრივი ჯანდაცვის მიღწევათა შორის პირველ ათეულში ერთ-ერთ მნიშვნელოვან მიღწევად, მაინც არსებობს მრავალი საწინააღმდეგო აზრი წყლის ხელოვნურად ფტორირებასთან დაკავშირებით. საქმე იმაშია, რომ ფტორი წარმოადგენს მნიშვნელოვან ქიმიურ კომპონენტს კარიესის პრევენციისათვის. მაგრამ მაღალი კონცენტრაციით იგი უაღრესად ტოქსიურია და უარყოფითად მოქმედებს არამხოლოდ კბილის ქსოვილზე, არამედ ტვინის ქსოვილებზე, კუნთებსა, თუ სისხლის უჯრედებზე.ფტორის დღიური დოზირების კონტროლი შეუძლებელია.რადგან, თუ მოხდება მისი სასმელ წყალში ხელოვნურად დამატება, პრაქტიკულად შეუძლებელი იქნება მისი დღიური დოზის გაკონტროლება თითოეულ ადამიანზე, ვინაიდან ყოველი ინდივიდი განსხვავებული რაოდენობით ღებულობს წყალს. ასე, მაგალითად, ის ადამიანები, რომელთაც აქვთ დიაბეტი, თირკმლის პათოლოგიები, ან უბრალოდ ათლეტები არიან, დღის განმავლობაში გაცილებით მეტი რაოდენობით ღებულობენ წყალს, ვიდრე სხვა დანარჩენი ადამიანები.უფრო მეტიც, ერთ-ერთი უმთავრესი მიზეზი, რის გამოც არ უნდა ხდებოდეს სასმელი წყლის ფტორირება არის ინფორმირებული თანხმობის უგულებელყოფა. ინფორმირებული თანხმობა წარმოადგენს სტანდარტულ წესს, რომელიც ვრცელდება ნებისმიერ მედიკამენტზე და გულისხმობს პაციენტის ინფორმირებულობას აღნიშნული პრეპარატის შესახებ. წყლის ფტორირებით კი მთავრობა აიძულებს მოსახლეობას მიიღოს პრეპარატი (ფტორის სახით), მიუხედავად მათი თანხმობისა.შესაძლებელია სასმელი წყლის ხელოვნურად ფტორირება არ წარმოადგენს ჯანმრთელობისათვის ძალზედ სერიოზულ საფრთხეს, მაგრამ ამავდროულად მისი თავიდან აცილება შეიძლეა მოხდეს ძალიან მარტივად.მაშინ როდესაც არსებობს ეჭვი ამ ქიმიური ნივთიერების ტოქსიურობის ირგვლივ, სჯობს ვიმოქმედოთ უსაფრთხოების პრინციპის მიხედვით, რომელიც მარტივად რომ ვთქვათ გვეუბნება: *„სადაც არა სჯობს, გაცლა სჯობს“.*

საკვანძო სიტყვები: *ფტორი, ტოქსიურობა, დიაბეტი, თირკმლის პათოლოგიები, დღიური დოზირება, სასმელი წყლის ფტორირება, კარიესი.*

Structure Activity Relationship of Biologically Active Flavonoids

Marwan Mohanad Tawfeeq[1],Lia Tsiklauri[1,2]

[1]The University of Georgia, School of Health Sciences and Public Health
[2]I. Kutateladze Pharmacochemistry Institute (TSMU); P. Sarajishvilist 36; Tbilisi, Georgia
[1] BA student, Pharmacy Bachelor Program in English; [1,2] Supervisor, PhD, Professor

Structure Activity Relationships (SAR) is relations between the molecular structure and biological activity of compounds and is used to determine the chemical groups responsible for evoking a target biological effect in the body, predict expected pharmacological activity, discover and develop new compounds. Flavonoids belong to the large group of natural polyphenolic compounds ubiquitously found in plants. Many reports illustrated that these secondary metabolites are responsible for the variety of pharmacological structure dependent activities, including antioxidant, antitumor, anti-inflammatory, antiviral and chemopreventive;it was suggested that the biological effects of flavonoids might depend on their anti-oxidant activity. The chemical nature of flavonoids depends on their structural class, degree of hydroxylation, other substitutions and conjugations. Flavonoids occur both in freestate and as glycosides. The common characteristic of the flavonoids (flavones, flavonols, flavanols, and flavanones) is the basic 15-carbon flavan structure ($C_6C_3C_6$; Fig.1). Classes of flavonoids differ in the level of saturation of the C ring. Individual compounds within a class differ in the substitution pattern of the A and B rings that influence the phenoxyl radical stability and the antioxidant properties of the substances. By several investigators have been demonstrated that the free radical-scavenging potential of natural polyphenolic compounds appears to depend on the number and location of free −OH groups on the flavonoid skeleton; flavonoids with multiple hydroxyl groups are more effective antioxidants than those with only one; the presence of the ortho-3,4-dihydroxy structure increases the antioxidative activityof these compounds;pro-oxidant effect of flavonoids are related to the presence of hydroxyl groups, especially in the B ring. The SAR studiesshowed that hydrophobicity and electronic property are key factors in the antibacterial activity of flavonoids; for example, high positive charges on C3 lead to an increase in antibacterial activity. Data from literature suggest thatoccurrence, position, structure, and total number of sugar moieties in flavonoid (flavonoids glycosides) play an important role in antioxidant activity;aglycones are more potent antioxidants than their corresponding glycosides.In conclusion we can say that SAR is key to many aspects of drug discovery, it can provide useful tools for revealing the nature of flavonoid action and may also help in the design of new and efficient flavonoids, which could be used as potential therapeutic agents.

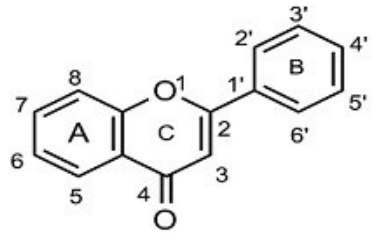

Fig. 1: Basic structure of flavonoid
Methods: Published scientific literature and journals from different sources

Key Words: *Flavonoids, SAR, antioxidative activity, radical-scavenging activity*

Bioavailability and Metabolism of Flavonoids

Oladoye Oluwole Olawale[1], Oyesiji Rilwan Oyebamiji[1], Lia Tsiklauri[2]

The University of Georgia, School of Health Sciences and Public Health
[1]BA student, Pharmacy Bachelor Program in English; [2]BA student, Pharmacy Bachelor Program in English; [3]Supervisor, PhD, Professor

Flavonoids are one of the largest nutrient families known to scientists, and include over 6,000 already-identified family members. These compounds have shown promising health promoting effects in human cell culture, experimental animal and human clinical studies. They have shown antioxidant, hypocholesterolemic, anti-inflammatory effects as well as ability to modulate cell signaling and gene expression related disease development. Despite of reported pharmacological effects various studies have shown that flavonoids have some drawbacks after oral administration. The biological fate of the flavonoids, including their glycoside forms, is highly complex, dependent on a large number of processes. Most of the biologically active flavonoids, are highly soluble in water, but are poorly absorbed from the intestine, highly metabolized, or rapidly eliminated. In addition, the metabolites that are found in blood and target organs and that result from digestive or hepatic activity may differ from the native substances in terms of biological activity. Most flavonoids existing in plants bound to sugars as glycosides. This structural characteristic determines if the flavonoid can be absorbed from the small intestine or has to go to the colon prior to absorption can occur. Flavonoid glycosides are first deglycosylated before the intestinal uptake, while aglycones can freely penetrate through cell membranes. Absorption from the small intestine is more active than from the colon and will cause higher plasma values. Absorbed flavonoids are transported to the liver where they undergo extensive metabolism generating dissimilar conjugation forms like glucuronides, sulphates and methylated derivatives. It has been proposed that these conjugates are responsible for the health-promoting effects of flavonoids. Flavonoids that cannot be absorbed from the small intestine will be degraded in the colon by microorganisms, which will break down the flavonoid ring structure. Some crude flavonoids are not used clinically because of these obstacles. The several studies demonstrated that typical polyphenols have oral bioavailability of 10% or less. In spite of the intensive studies on flavonoids, there is still a gap between the knowledge of bioavailability of these compounds and their health-promoting effects. The identification of key factors that govern metabolism and an understanding of how the differential capacity to metabolize these bioactive compounds affect health outcomes will help establish how to optimize intakes of flavonoids for health benefits and in specific subgroups.
Methods: Published scientific literature and journals from different sources.

Key Words: *Absorption, Bioavailability, Flavonoids and Metabolism*

Dental Caries

Ali Makki Hameed[1], Ketevan Nanobashvili[2]

The University of Georgia, School of Health Sciences and Public Health
[1]Student, Dental program in English; [2]Supervisor, MD, PhD, Associate Professor

Dental caries is the scientific term for tooth decay or cavities. It is caused by specific types of bacteria. Dental caries continue to be an endemic infection and a major public health problem, 60–90% of school children and nearly 100% of adults have dental cavities. Globally, about 30% of people aged 65–74 have no natural teeth, which is caused from cavities. Early caries may not have any symptoms. Later, when the decay has eaten through the enamel, the teeth may be sensitive to sweet, hot or cold foods or drinks. Caries in its early stages can be stopped. It can even be reversed. The purpose of this research is to identify and summarize the various ways of controlling dental caries, highlighting the importance of Fluoride and other preventive factors. In this article it was pointed out that development of dental carries is the result of three independent factors coming together - the causative agent: the host and the environment. The absence of one of the factors won't lead the carries to develop. Scientific advances have led to improvements in the prevention, diagnosis and treatment of dental caries. It was concluded that a great management of dental caries requires an early detection. Then spotlighting preventive dentistry that commonly utilize exogenous materials such as fluoride or sealants it's pointed out here that protective factors that help to remineralize enamel include exposing the teeth to fluoride, limiting the frequency of carbohydrate consumption, choosing less cariogenic foods, practicing good oral hygiene, receiving regular dental care, and delaying bacterial colonization. In addition to another important key tool of fighting the bacteria which is our own saliva. Farther to restoration, reviewing restorative materials and their characteristics. The last step of caries developing process is cavity formation. In this case prevention measures are not helpful and it needs more invasive operative measures for stopping the pathological process. Operative measures include cutting of affected tissues, which after will be replaced by restorative materials. Restoration is needed not only for isolation of opened dental tubes, by which oral bacteria may reach the pulp of the tooth, but also for restoration of anatomic shape of the crown. This procedure will maintain tooth function – active chawing and biting process.

For restoration purposes mostly are used several materials: Glass-ionomeer cements and Compsite resins.

Key words: *Dental Caries, Prevention, Treatmen*

Depression: The Leading Cause of Many Psychological Disorders and Health Problems

Isaac Omotayo Adesoji

The University of Georgia, School of Health Sciences and Public Health
Student, Pharmacy English Bachelor Program

Depression is a mental disorder, affecting teenagers, youths and adult. It is characterized by fear, sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration. It can be short, long-lasting or recurrent. Some people think depression is trivial and not a genuine health condition. They're wrong – it is a real illness with real symptoms. At a chronic condition it leads to Suicide. Close to 800 000 people die due to suicide every year. Suicide is the second leading cause of death in 15-29-year-olds. Globally, it was found that depression is the second-leading cause of disability, with slightly more than 4 percent of the world's population diagnosed with it and more than 300 million people of all ages suffer from depression. The aware ness of the severe health problem that can result due to depression is a problem that must be discussed in all health sectors.

Background: Depression is at the peak in many developing countries which need proper attention from all health sectors in order to curb the danger it is imposing in the entire world. The aim of this study is to discuss briefly the causes, Risk Factors, types, symptoms of depression and the treatment and drugs that can be used to suppress it. Drugs like SSRIs, SNRIs, NDRIs, and MAOIs are discussed briefly in this material. Method: Articles were gathered from different website, textbooks and other related health journals based on the topic at hand.

Conclusion: in conclusion I believe this brief material on depression has helped to understand the side effect of depression and how it can be control. There should be stipulated guidelines to control depression.

Abbreviations: *SSRIs-- Selective serotonin reuptake inhibitors. SNRIs-- Serotonin norepinephrine reuptake inhibitors. NDRIs-- Norepinephrine-dopamine reuptake inhibitors. MAOIs-- Monoamine oxidase inhibitors.*

Key words: *Depression, Cause, Psychological Disorders, Health Problems*

Facial Fractures

Vahidreza Rezaee Hassanabadi[1], Davit Topuria[2]

The University of Georgia, School of Health Sciences and Public Health
[1]Student, Dental program in English; [2]Supervisor MD, PhD, Associate Professor

Facial trauma can involve soft tissue injuries such as burns, lacerations and bruises, or fractures of the facial bones during motor vehicle accidents, assaults, sporting injuries and falls. The facial bones are thin and light making them susceptible to injury. Epidemiology: Males are affected more commonly than females and facial fractures are most common in the third decade. Pathology: The nasal bones are the most commonly fractured single bone, followed by the mandible and the bony orbit. Fractures involving more than one bone most commonly affect the orbital floor and zygomaticomaxilla. Types- complex fractures which involve multiple facial bones: naso-orbitoethmoid (NOE) complex fracture, Le Fort fractures zygomaticomaxillary complex fracture, Complex midfacial fracture. fractures which involve a single facial bone: frontal sinus fracture, nasal bone fracture, orbital blow-out fracture, isolated zygomatic arch fractures, paranasal sinus fractures, alveolar process fractures, mandibular fracture. Emergency Treatment: Clear Airway and provide patent airway, Control Hemorrhage, Evaluate Associated Injuries, Diagnosis and treatment of facial injuries. Radiographic features- Radiograph: Plain x-rays are relatively insensitive to facial fractures; CT: MDCT is the modality most often used for imaging evaluation in facial fractures because of: rapid examination with easier patient positioning providing high image resolution which allows accurate detection of subtle facial fractures and also clearly delineates soft -tissue feature. Treatment: This depends on your specific injury, how bad it is, and whether you have any other problems at the time. Your doctor's goal will be to put the bones back into their natural position. This is called "reducing" the fracture. He'll also want to keep the bones in place to prevent further injury. Doctors call this "fixing" the fracture. You may need surgery or, your doctor may use plates, screws, wires, or other devices to repair your injury. He may also prescribe antibiotics to prevent infection. The plates used to repair facial fractures are made of titanium. They hold together and strengthen the bones of your face, head (or skull) and/or jaws. The plates used to repair facial fractures are designed to be left in place and stay with your bone permanently. Very occasionally, they might need to be removed later for example if they cause an infection or discomfort.

Abbreviations: *NOE- naso-orbitoethmoid*

Key words: *Facial Fractures*

Heavy Metals as Toxic Substances

Davit Tophuria[1], Maia Matoshvili[2], NinoAdamia[3]

Tbilisi State Medical University
Departments: Human Normal Anatomy[1], Dermatology and Venereology[2], Pediatrics[3],
[1]Supervisor MD, PhD, Associate Professor; [2]MD, PhD, Assistant Professor; [3]MD, PhD

Heavy metal toxicity has proven to be a major threat and there are several health risks associated with it. The toxic effects of these metals, even though they do not have any biological role, remain present in some or the other form harmful for the human body and its proper functioning. They sometimes act as a pseudo element of the body while at certain times they may even interfere with metabolic processes. Few metals, such as aluminium, can be removed through elimination activities, while some metals get accumulated in the body and food chain, exhibiting a chronic nature. Various public health measures have been undertaken to control, prevent and treat metal toxicity occurring at various levels, such as occupational exposure, accidents and environmental factors. Metal toxicity depends upon the absorbed dose, the route of exposure and duration of exposure, i.e. acute or chronic. This can lead to various disorders and can also result in excessive damage due to oxidative stress induced by free radical formation. This review gives details about some heavy metals and their toxicity mechanisms, along with their health effects.

Key words: *heavy metals, metal toxicity, oxidative stress, free radicals.*

History and Functions of Quiescent Hepatic Stellate Cell

Davit Tophuria[1], Maia Matoshvili[2], NinoAdamia[3]

Tbilisi State Medical University
Departments: Human Normal Anatomy[1], Dermatology and Venereology[2], Pediatrics[3],
[1]Supervisor MD, PhD, Associate Professor; [2]MD, PhD, Assistant Professor; [3]MD, PhD

In 1876, von Kupffer described liver Sternzellen (star-shaped cells). The functions of these cells remained enigmatic for 75 years until Ito observed lipid-containing perisinusoidal cells in human liver. In 1971, Wake demonstrated that the Sternzellen of von Kupffer and the fat-storing cells described by Ito were identical. Wake also established that these cells were important sites of vitamin A storage. Soon thereafter, Kent and Popper demonstrated that the stellate cells were intimately linked to the pathogenesis of hepatic fibrosis. Since then, these cells have been studied in detail. Quiescent stellate cells represent 5-8% of the total number of liver cells. They play a cardinal role in storage and controlled release of retinoids. They control extracellular matrix (ECM) turnover in the space of Disse by secreting the correct amounts of a limited number of ECM molecules, and by releasing matrix metalloproteinases and their inhibitors. By virtue of their long cytoplasmic processes, quiescent stellate cells presumably contribute to the control of blood flow through the sinusoidal capillaries. They are important sources of paracrine, autocrine, juxtacrine, and chemoattractant factors that maintain homeostasis in the microenvironment of the hepatic sinusoid.

Key words: *Liver - hepatic stellate cells - extrahepatic stellate cells - vitamin A - extracellular matrix - sinusoidal blood flow - intercellular communication - fibrosis - cirrhosis - portal hypertension - liver cancer.*

Liver Fibrosis and Cirrhosis: Role of The Fibroblastic Cell Subpopulations

Davit Tophuria[1], Maia Matoshvili[2], Ivane Saparishvili[3]

Tbilisi State Medical University
Departments: Human Normal Anatomy[1], Dermatology and Venereology[2], Pediatrics[3],
[1]Supervisor MD, PhD, Associate Professor; [2]MD, PhD, Assistant Professor; [3]PhD student

Liver fibrosis is defined as the excessive deposition of extracellular matrix in an organ, is the main complication of chronic liver damage. Its endpoint is hepatic cirrhosis, which is responsible for significant morbidity and mortality. The accumulation of extracellular matrix observed in fibrosis and cirrhosis is due to the activation of fibroblasts, which acquire a myofibroblastic phenotype. Myofibroblasts are absent from normal liver. They are produced by the activation of precursor cells, such as hepatic stellate cells and portal fibroblasts. These fibrogenic cells are distributed differently in the hepatic lobule: the hepatic stellate cells resemble pericytes and are located along the sinusoids, in the Disse space between the endothelium and the hepatocytes, whereas the portal fibroblasts are embedded in the portal tract connective tissue around portal structures (vessels and biliary structures). Differences have been reported between these two fibrogenic cell populations, in the mechanisms leading to myofibroblastic differentiation, activation and "deactivation", but confirmation is required. Second-layer cells surrounding centrolobular veins, fibroblasts present in the Glisson capsule surrounding the liver, and vascular smooth muscle cells may also express a myofibroblastic phenotype and may be involved in fibrogenesis. It is now widely accepted that the various types of lesion (e.g., lesions caused by alcohol abuse and viral hepatitis) leading to liver fibrosis involve specific fibrogenic cell subpopulations. The biological and biochemical characterisation of these cells is thus essential if we are to understand the mechanisms underlying the progressive development of excessive scarring in the liver. These cells also differ in proliferative and apoptotic capacity, at least in vitro. All this information is required for the development of treatments specifically and efficiently targeting the cells responsible for the development of fibrosis/cirrhosis.

Key words: *Myofibroblast, Fibrogenesis, Liver Damage, Chirosis*

The Hepatic Stellate Cell and Its Role in Human Liver Diseases

Davit Tophuria[1], Maia Matoshvili[2], NinoAdamia[3], Levan Donadze[4]

Tbilisi State Medical University
Departments: Human Normal Anatomy[1], Dermatology and Venereology[2], Pediatrics[3],
[1]Supervisor MD, PhD, Associate Professor; [2]MD, PhD, Assistant Professor; [3]MD, PhD, [4]PhD student

The hepatic stellate (Ito) cell lies within the space of Disse and has a variety of functions. Stellate cells store vitamin A in characteristic lipid droplets. In the normal human liver, the cells can be identified by the presence of these lipid droplets; in addition, many stellate cells in the normal liver express alpha-smooth muscle actin. In acute liver injury, there is an expansion of the stellate cell population with increased alpha-smooth muscle actin expression; stellate cells appear to play a role in extracellular matrix remodelling after recovery from injury. In chronic liver injury, the stellate cell differentiates into a myofibroblast-like cell with marked expression of alpha-smooth muscle actin and occasional expression of desmin. Myofibroblast-like cells have a high fibrogenic capacity in the chronically diseased liver and are also involved in matrix degradation. In vitamin A intoxication, hypertrophy and proliferation of the stellate and myofibroblast-like cells may lead to non-cirrhotic portal hypertension, fibrosis and cirrhosis. In liver tumours, myofibroblast-like cells are involved in the capsule formation around the tumour and in the production of extracellular matrix within it. The transition of stellate cells into myofibroblast-like cells is regulated by an intricate network of intercellular communication between stellate cells and activated Kupffer cells, damaged hepatocytes, platelets, endothelial and inflammatory cells, involving cytokines and nonpeptide mediators such as reactive oxygen species, eicosanoids and acetaldehyde. The findings suggest that the stellate cell plays an active role in a number of human liver diseases, with a particular reactivity pattern in fibrotic liver disorders.

Key words: *Hepatic Stellate cell, Liver Damage, Chirosis*

New Derivatives of 10-chloro-5,10-dihydrophenarsazine with Potential Biological Activity

Lili Arabuli[1,2], Nodar Sulashvili[2], Natia Kvizhinadze[3]

The University of Georgia, School of Health Sciences and Public Health
[1]Associate Professor; [2] PhD (c), Head of the Biochemistry and Pharmacology Division; [3]Associate Professor

Synthesis and some physical-chemical characteristics of some arsenic and antimony organic thioesters were described with potential biological activities. These arsenic-sulfur containing compounds showed significant antimicrobial, anti-insecticidal activities. Arsenic has a high affinity for sulfur and reactive sulfur-containing molecules such as reduced thiols. Arsenic ions are binding to cellular proteins in vivo where sulfur atoms of thiolate groups act as coordinating ligands. The resulting arsenic-thiol linkages are mainly responsible for the ability of arsenic to modulate the function of various key molecules, enzymes and ion transporters inside cells. Arsenic-based drugs can react by coordinating binding to free thiol groups such as cysteine, particularly those of thioredoxin and glutathione as the major intracellular thiol species important in cellular redox regulation. Another sulfurcontaining compounds – (2-phenyl-[1,2,3]dithioarsolan-4-yl)-methanol derivatives showed in vitro antileukemic activity. 10-chloro-5,10-dihydrophenarsazine due to its toxicity and reactivity is known as one of the chemical warfare agent, thus it appeared of interest to convert them to relatively non-toxic and stable substances, in addition with various biological activities. We have aimed to use 10-chloro-5,10-dihydrophenarsazine, as a starting material to prepare 5,10-dihydro-10-(meracptophenyl)-phenarsazine and 5,10-dihydro -10-(2-meracptobenzothiazo-le)-phenarsazine and their Pd(II) complexes. The starting 10-chloro-5,10-dihydrophenarsazine with stabilization of reactive As-Cl bond, have been converted into low toxic and low reactive compounds, with their applications as polydentate coordinating ligands for more stabilization and for increasing of physiological activities. Mass spectrograms of 10-chloro- and 10-methyl-5,10-dihydrophenarsazine were determined. These spectrograms show the following main characteristics of the fragmentation behavior for these heterocycles: (a) the relative stability in both compounds of the arsenic atom in the heterocyclic skeleton; (B) exceptionally easy cleavage of the As-Cl bond, in contrast to the behavior of the As-CH3 bond; And (c) easy formation of the phenarzazine species from 10-chloro-5,10-dihydrofarnazazine. The new As, N, S- containing compounds were characterized by various spectrophotometric (MS, Uv-vis, IR, ^{1}H, ^{13}C – NMR etc) analyses. The toxicity and biological activity (antimicrobial, antifungicidal, antiinsecticidaletc) of synthesized compounds are under testing and evaluation.

Key words: *10-chloro-5,10-dihydrophenarsazine, Biological Activity, Arsenic, spectrophotometric, arsenic-thiol, antileukemic activity.*

Oral Cavity Infections and The Relations to The Systemic Diseases

Abdullah Sameer Azeez

The University of Georgia, School of Health Sciences and Public Health
Student, Dental program in English

The oral cavity contains some of the most varied and vast flora in the entire human body and is the main entrance for 2 systems vital to human function and physiology, the gastrointestinal and respiratory systems. a specific pathologic condition, such as periodontitis (i.e., inflammation of the periodontal attachment of the teeth and the alveolar bone), may be present in the oral cavity. These specific conditions can affect many other vital systems, such as the cardiovascular and renal systems abscesses (i.e., inflammation and abscess of the tissue attached to the apex of the root) may lead to subacute bacterial endocarditis (BE) and glomerulonephritis (GN).The microenvironment of the oral cavity changes with the age of the patient, the eruption or loss of teeth, and the appearance of disease states (e.g., caries, periodontal disease). Systemic changes, such as pregnancy or drug intake, also alter the number and proportion of flora. These changes are due to alterations in the flow and composition of salivary fluid and in the levels and activity of defense components (e.g., immunoglobulins, cytokines) in the saliva. Effective strategies to prevent and control infectious diseases require a basic understanding of the causative agent, the pathogenesis of the disease, and the individuals at risk. Intervention can occur at any of these three points in the natural history of the disease. Attempts to control oral infections have met with limited success. Two of the most common oral infectious diseases, caries and periodontal disease, are among the most common Careful examination of the oral cavity may reveal findings indicative of an underlying systemic condition, and allow for early diagnosis and treatment. Examination should include evaluation for mucosal changes, periodontal inflammation and bleeding Oral findings of anemia may include mucosal pallor, atrophic glossitis, and candidiasis. Oral ulceration may be found in patients with lupus erythematosus, pemphigus vulgaris, or Crohn disease. periodontal inflammation or bleeding should prompt investigation of conditions such as diabetes mellitus, human immunodeficiency virus infection, thrombocytopenia, and leukemia. In patients with gastroesophageal reflux disease, bulimia, or anorexia. Periodontitis is a common chronic bacterial infection of the supporting structures of the teeth. The host response to this infection is an important factor in determining the extent and severity of the disease. Systemic conditions may modify the extent of periodontitis principally through their effects on normal immune and inflammatory mechanisms. In very rare cases, bacteria in the mouth may trigger endocarditis in people at higher risk. Here's what happens: Bacteria found in tooth plaque may multiply and cause gingivitis (gum disease). If not treated, this may become advanced.

Abbreviations: *bacterial endocarditis (BE) and glomerulonephritis (GN)***.**

Key words: *periodontitis, streptococcus infections, infections control, early detection, preventions tools, immunity***.**

Pediatric Facial Fracture

Ahmed A. Abdulwahab[1], Ketevan Nanobashvili[2]

The University of Georgia, School of Health Sciences and Public Health
[1]Student, Dental program in English; [2]Supervisor, MD, PhD, Associate Professor

Facial injuries in children always present a challenge in respect of their diagnosis and management. Since these children are of a growing age every care should be taken so that later the overall growth pattern of the facial skeleton in these children is not jeopardized. Pediatric trauma involving the bones of the face is associated with severe injury and disability. Although much is known about the epidemiology of facial fractures in adults, little is known about national injury patterns and outcomes in children in the US. The epidemiology of facial injuries in children and adolescents (ages 0 to 18 years) was described using the National Trauma Data Bank (2001 to 2005) to examine facial fracture pattern, mechanism, and concomitant injury by age. A total of 12,739 (4.6%) facial fractures were identified among 277,008 pediatric trauma patient admissions. The proportion of patients with facial fractures increased substantially with age. The most common facial fractures were mandible (32.7%), nasal (30.2%), and maxillary/zygoma (28.6%). The most common mechanisms of injury were motor vehicle collision (55.1%), violence (11.8%), and falls (8.6%). These fracture patterns and mechanisms of injury varied with age. Compared with patients without facial fractures, patients with fractures exhibited substantial injury severity, hospital lengths of stay, ICU lengths of stay, ventilator days, and hospital charges. In addition, patients with facial fractures had more severe associated injury to the head and chest and considerably higher overall mortality. Causes and patterns of facial fractures vary with age. Cranial and central facial injuries are more common among toddlers and infants, and mandible injuries are more common among adolescents. Although bony craniofacial trauma is relatively uncommon among the pediatric population, it remains a substantial source of mortality, morbidity, and hospital resource use. Continued efforts toward injury prevention are warranted. Facial fracture management is often complex and demanding, particularly within the pediatric population. Although facial fractures in this group are uncommon relative to their incidence in adult counterparts, a thorough understanding of issues relevant to pediatric facial fracture management is critical to optimal long-term success. Here, we discuss several issues germane to pediatric facial fractures and review significant factors in their evaluation, diagnosis, and management.

Key words: *Pediatric facial fracture, complications, management, epidemiology, pediatric trauma.*

The Oral Effects of Anemia

Ali Ahmed Yas [1], Ketevan Nanobashvili[2]

The University of Georgia, School of Health Sciences and Public Health
[1]Student, Dental program in English; [2]Supervisor, MD, PhD, Associate Professor

Anemia is a pathologic condition in which the red blood cells count is lower than normal. Anemia also occurs when the red blood cells don't contain enough of the iron-rich protein hemoglobin, which gives blood its red hue. Hemoglobin helps red blood cells transport oxygen throughout the body. In presence of anemia, the body may not get an adequate supply of oxygen-rich blood. This can result the problems as serious as heart failure. It can also affect oral cavity organs. The oral cavity plays a critical role in numerous physiologic processes, including digestion, respiration, and speech. It is also unique for the presence of teeth and mucosa. The mouth is frequently involved in conditions that affect the skin, but it is also affected by many systemic diseases. Oral involvement may precede or follow the appearance of findings at other locations. This article is intended as a general overview of conditions with oral manifestations of systemic diseases – especially anemia: An increased risk for periodontitis, or gum diseases, Abnormally pale tissue in the oral cavity due to a decreased number of red blood cells, Inflammation of the tongue, called glossitis. The tongue may appear swollen, smooth, and pale, and it may feel sore and tender. The dentist must know if the patient has anemia before scheduling any procedures. Common anemia associated with oral manifestations include iron-deficiency anemia and macrocytic anemia secondary to B-12 deficiency. Hemochromatosis, a syndrome of systemic iron overload, may be caused by hereditary hemochromatosis, transfusional iron overload, chronic hemolysis, or excess dietary iron. Oral manifestations are observed in approximately 15-25% of patients. In the majority of these patients, there is a blue-gray hyperpigmentation of the oral mucosa. The most commonly affected sites are the buccal mucosa and gingiva, although a minority of patients have diffuse, homogenous pigmentation of the oral cavity. Histologic examination with Prussian blue stain reveals iron mineral deposits. Congenital erythropoietic porphyria is a rare, autosomal recessive disease caused by a mutation in the *UROS* gene, which encodes uroporphyrinogen III synthase. This enzyme defect disrupts hemebiosynthesis and leads to an accumulation of uroporphyrin in erythrocytes, which, in turn, increases their osmotic fragility and results in hemolysis. In the oral cavity, erythrodontia, a red-brown discoloration of the teeth, is pathognomonic for congenital erythropoietic porphyria. Teeth appear bright red with exposure to UV fluorescence. It has been proposed that erythrodontia is due the binding of excess porphyrin to calcium phosphate in dentin and enamel, although this condition is not present in other porphyrias. So, the body uses iron to build healthy skin, hair, nails, and teeth. Common symptoms of anemia seen in the oral cavity includes sores, reduced number and size of taste buds, burning tongue and mouth, discoloration, and oral infections. Infections that start in the throat and mouth areas can quickly spread throughout the rest of the body and cause more severe health concerns. Regular flossing prevents buildup of bacteria and can lower the risk of illness.

Key words: *Anemia, Caries, Oxygen supply, Genetics, Oral cavity, Teeth, nutrition.*

დაფინანსების გავლენა სამედიცინო სერვისების ხელმისაწვდომობაზე

ქეთევან ჯაფარიძე

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებათა და საზოგადოებრივი ჯანდაცვის სკოლა
სტუდენტი ბაკალავრი, ჯანდაცვის ადმინისტრირება

სამედიცინო სერვისებზე ხელმისაწვდომობა უმნიშვნელოვანეს ამოცანას წარმოადგენს ნებისმიერი ქვეყნის ჯანდაცვის სისტემისთვის. აღნიშნულის შესრულებისთვის რიგი ქმედებების განხორციელებაა საჭირო,რომელთაც ქვეყნები განსხვავებულად ასრულებენ. ჯანდაცვის სისტემების მთავარ დანიშნულებას წარმოადგენს როგორც ადამიანების ჯანმრთელობის მდგომარეობის გაუმჯობესება,ასევე მათი დაცვა ავადმყოფობასთან დაკავშირებული ფინანსური ხარჯებისგან. ჯანდაცვის მსოფლიო ორგანიზაციის მიერ რეკომენდებულია შემდეგი აქტივობების შესრულება:საკმარისი რესურსების მოზიდვა,სამედიცინო სერვისების მიღებისთვის ჯიბიდან გადაგხილი თანხის შემცირება,ეფექტურობისა და სამართლიანობის გაუმჯობესება.თუმცა ქვეყნის დონეზე მიდგომები შეიძლება განსხვავდებოდეს. ჯანდაცვის სექტორისთვის დამატებითი სახსრების წყაროები შესაძლოა მრავალფეროვანი იყოს. საქართველოში ახლო ისტორიული წარსულის მიმოხილვით ნათლად ჩანს,რომ 2007 წლიდან დაიწყო მოსახლეობის მიზნობრივი ჯგუფების მოცვა სახელმწიფოს მიერ დაფინანსებული სადაზღვევო პროგრამებით,სამედიცინო მომსახურების ხელმისაწვდომობაზე ფინანსური ბარიერების შემცირების მიზნით.აღნიშნული ჯგუფებისთვის მომსახურების შესყიდვა ხორციელდებოდა კერძო სადაზღვევო კომპანიების მიერ. 2013 წლის დასაწყისიდან ამოქმედდა საყოველთაო ჯანდაცვის პროგრამა,რომლითაც განხორციელდა დაუზღვეველი მოსახლეობის მოცვა არამომგებიანი სადაზღვევო ფონდის მეშვეობით.პირველ ეტაპზე დაფინანსებული სერვისები მოიცავდა ამბულატორიულ მომსახურებას,პროგრამის გაფართოების შემდეგ,ძალაში შევიდა ჰოსპიტალური მომსახურების დაფინანსებაც. მსოფლიო ჯანდაცვის ორგანიზაციის განმარტებით,უნივერსალური მოცვის მაჩვენებლების მიღწევა გულისხმობს, არამხოლოდ მთელი მოსახლეობის დაზღვევას არამედ დაზღვევით მოცული სამედიცინო სერვისების დაფინანსებას. გასათვალისწინებელია, რომ საუკეთესო შედეგის მიხწევა შესაძლებელია მხოლოდ ჯანდაცვის დაფინანსების წინაშე მდგარი 3 ძირითადი ამოცანის-რესურსების მოზიდვა,მოზიდული რესურსების გაერთიანება და მომსახურების შესყიდვა-სრულყოფილად გადაჭრის შემთხვევაში. დროული ხელმისაწვდომობა ჯანმრთელობის სერვისებზე-ჯანმრთელობის ხელშეწყობის, პრევენციის, მკურნალობისა და რეაბილიტაციის კომბინაციაზე კრიტიკული მახასიათებელია,რომრლიც ვერ იქნება მიღწეული კარგად ფუნქციონირებადი ჯანდაცვის დაფინანსების გარეშე.

საკვანძო სიტყვები: *ჯანდაცვის სერვისები, დაფინანსება, ხელმისაწვდომობა.*

ფსიქოტროპული საშუალებების გვერდითი რეაქციებით გამოწვეული ავადობის შემთხვევების ეკონომიკური ანალიზი

ეთერი შურღაია[1], ელზა ნიკოლეიშვილი[2]

საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებისა და საზოგადოებრივი ჯანდაცვის სკოლა
[1]დოქტორანტი, საზოგადოებრივი ჯანდაცვა; [2]ხელმძღვანელი, მედიცინის აკადემიური დოქტორი, პროფესორი

საქართველოს ფარმაცევტული ბაზრის ასორტიმენტისა და წამალთა მოხმარების განუხრელი ზრდა, მიღებულ კლინიკურ ეფექტთან ერთად, მთელ რიგ შემთხვევებში, განაპირობებს გვერდითი მოვლენების გამოვლენის სიხშირის მატებას, რისი პრევენციის მიზნითაც საქართველოში ხორციელდება ფარმაკოზედამხედველობის სისტემის ეტაპობრივი დანერგვა. ფარმაკოლოგიური მიღწევებისა და, პარალელურად, ფარმაცევტული ინდუსტრიის განვითარების შედეგად მსოფლიო ქმნის ძლიერ ფსიქოტროპულ სამკურნალო საშუალებებს რომლებიც, დანიშნულებისამებრ გამოყენებისას, აუმჯობესებენ პაციენტის სიცოცხლის ხარისხს, თუმცა ამ მედიკემენტების არარაციონალურად ან/და არადანიშნულებით მოხმარებამ შესაძლოა გამოიწვიოს ჯანმრთელობის მდგომარეობის სერიოზული გართულებები ან/და ფიზიკო-ფსიქოლოგიური დამოკიდებულება. სამკურნალო საშუალების გამოყენებით გამოწვეული გვერდითი რეაქციები შესაძლოა გახდეს პაციენტისთვის გადაუდებელი სამედიცინო დახმარების გაწევის ან მისი ჰოსპიტალიზაციის მიზეზი, რაც თავის მხრივ, უკავშირდება მნიშვნელოვან ეკონომიკურ დანახარჯებს. ამავდროულად, წამლის გვერდითი რეაქციით გამოწვეული კლინიკური მდგომარეობის მართვის მიზნით ინიშნება დამატებითი ფარმაკოთერაპიული სქემები, რაც, ეკონომიკურ ხარჯებთან ერთად, ზრდის ახალი გვერდითი ეფექტების წარმოშობის ალბათობას. კვლევის მიზანს წარმოადგენს ფსიქოტროპული საშუალებების გვერდითი რეაქციებით გამოწვეული ავადობის შემთხვევების ეკონომიკური ანალიზი. კვლევის მიზნებისთვის, ფსიქოტროპული საშუალებებით გამოწვეული გვერდითი რეაქციების გამოვლენა განხორციელდება სამედიცინო დაწესებულებებში, სამედიცინო კლასიფიკატორების სისტემის (ICD 10) კოდების გამოყენებით. ჯანმრთელობის მსოფლიო ორგანიზაციის მიერ რეკომენდებული მეთოდიკით შეფასდება საქართველოში არსებული ფარმაკოზედამხედველობის სისტემის ინდიკატორები. ფსიქოტროპული საშუალებებით გამოწვეული გვერდითი რეაქციების ეკონომიკური ტვირთი დადგინდება ავადობის შემთხვევების მართვის მიზნით გაწეული პირდაპირი სამედიცინო და პირდაპირი არასამედიცინო ხარჯების დაანგარიშების გზით. ფარმაკოზედამხედველობის სისტემის ინდიკატორების გამოყენება შესაძლებლობას ქმნის სწორად შეფასდეს არსებული სისტემის რესურსები და ფუნქციონალურობა და, შედეგად, დადგინდეს საჭირო პროფესიული მეთოდოლოგიებისა და საკანონმდებლო რეგულაციების აუცილებლობა. ამავდროულად, პაციენტთა სიცოცხლის ხარისხის გაუმჯობესების მიზნით, დაიგეგმოს ღონისძიებები ფარმაკოზედამხედველობის საბაზისო კომპონენტებისა და სამედიცინო მომსახურების სფეროში უსაფრთხო და ეფექტური ფარმაკოთერაპიის პრინციპების დანერგვის ხელშეწყობის მიმართულებით. ფსიქოტროპული საშუალებების გვერდითი რეაქციებით გამოწვეული ეკონომიკური ანალიზი საშუალებას იძლევა, სამედიცინო მომსახურებაზე გაწეული ხარჯების შემცირების მიზნით, ჯანმრთელობის დაცვის სისტემაში დაისახოს პრიორიტეტული მიმართულებები და რაციონალურად განისაზღვროს ეკონომიკური რესურსები ქმედითი ღონისძიებების გასატარებლად.

საკვანძო სიტყვები: *ფსიქოტროპული საშუალებები, გვერდითი რეაქციები, ეკონომიკური ანალიზი*

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