Demography and the context of health in paliative care

Richard Didič[1] , Jaroslav Stančiak[2], Martin Samohýl[3], Róbert Babeľa[4]

[1]PhD student at Institute of Social Disciplines, St. Elizabeth University , Bratislava

[4]Institute of Health Care Disciplines, St. Elizabeth University , Bratislava

[2]Comenius University in Bratislava, Faculty of Education Department of Social Work, Slovakia

[3] Institute of Hygiene, Faculty of Medicine, Comenius University in Bratislava, Slovak Republic

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Recenzent/Review: PhDr. Mgr. et Mgr. Patrik Christian Cmorej, PhD., MHA
Fakulta zdravotnických studií
Univerzita J. E. Purkyně v Ústí nad Labem

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Introduction

The complex health state of population, and also the health care in Europe has been improving (Jakab, 2011). Life expectancy at birth just reflects the fact, that since 1980 it increased by 5 years, in 2010 it reached 75 years, and further is expected to reach approximately 81 years of age by 2025 (Jakab, 2011). Life expectancy at birth is one of the main indicators bound with health status of population reflecting the standards of living, the lifestyle of population, better education and access to health services (OECD - https://data.oecd.org/healthstat/life-expectancy- at-birth.htm, retrieved: 17.01.19, 20:32).

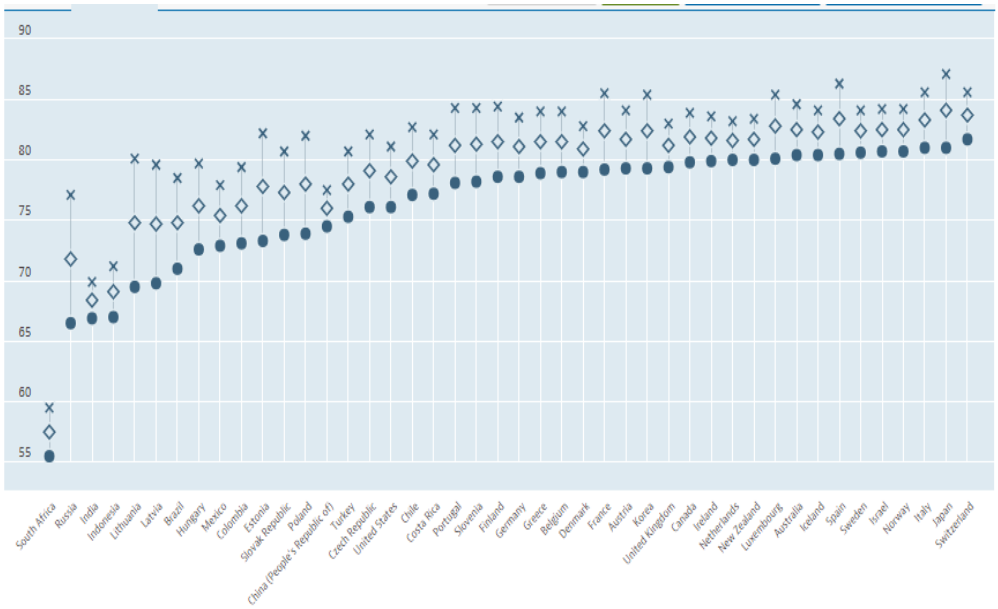

*Figure 1 LIfe expectancy at birth (*OECD - https://data.oecd.org/healthstat/life-expectancy-at-birth.htm, : 17.01.19, 20:32)

Since the middle of 19th century, the population of Europe has been more than doubled, but in recent decades it was not less significant. In 1960, the EU-27 states gained the level of 415 million people, but since then the figure has increased by 80 million.

Expected is the growth of EU – 15 category, in the given regions, where the average life expectancy will continue to grow, and by 2050 it is expected to reach 85 years of age (Jakab, 2011). For comparison, the Commonwealth of Independent States expects reaching the level of 75 years, what is the level seen in Europe 45 years ago as well as with the EU - 15 level 65 years ago (Jakab, 2011).

According to Eurostat projections in the period between 1st January 2016 and 1st January 2080, the total amount of EU – 28 population is expected the rise by 1.7%, the total number of population will increase by 8.5 million people (https: //ec.europa. eu, 2018). Population is projected to reach its peak around 2045, and reach 529 million people, what is the increase of 18.8 million compared with the situation in January 2016 (https://ec.europa.eu, 2018). Subsequently the gradual decline in the number of inhabitants foreseen in early 2080 is 519 million as the total amount of population (https://ec.europa.eu, 2018).

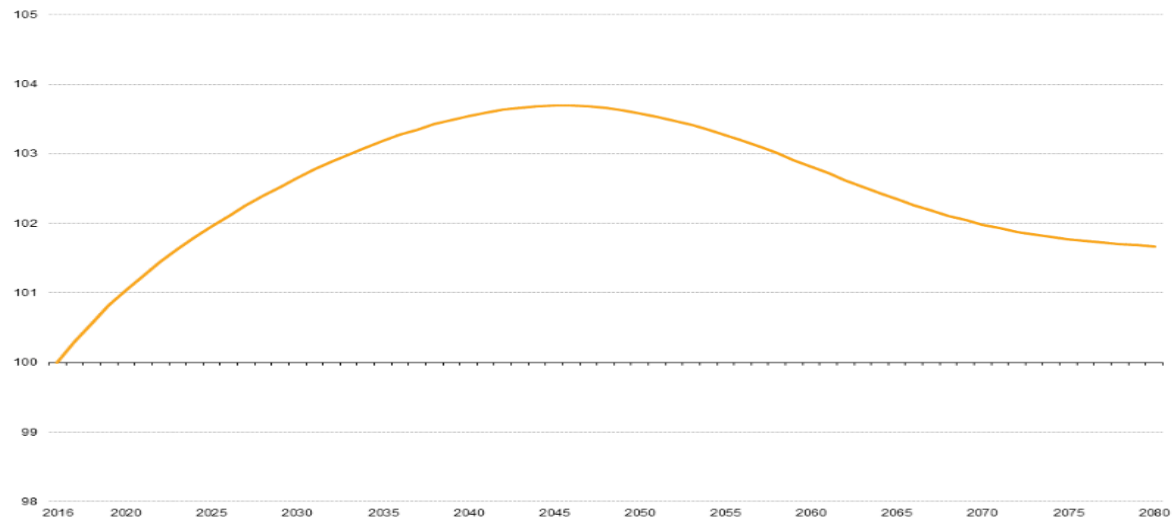

Figure 2 Development of EU population , (https://ec.europa.eu, 2018).

Further is expected gradual decrease of children, both in relative and absolute terms, from 15.6% in early 2016 (79.5 million) to 15.2% in 2080 (78.9 million). (https://ec.europa.eu, 2018).

The share of EU-28 working-age population has been declining, it will drop from 333 million to 288.4 million by 2080 (https://ec.europa.eu, 2018). The overall decline in the working age of the next 6.5 decades is projected to 44.5 million people, and by 2035 it is projected the decrease below 60% in the working age group with further remaining below by 2080 (https: / /ec.europa.eu, 2018). The trend points to the additional 53.3 million of older people by 2080 (https://ec.europa.eu, 2018).

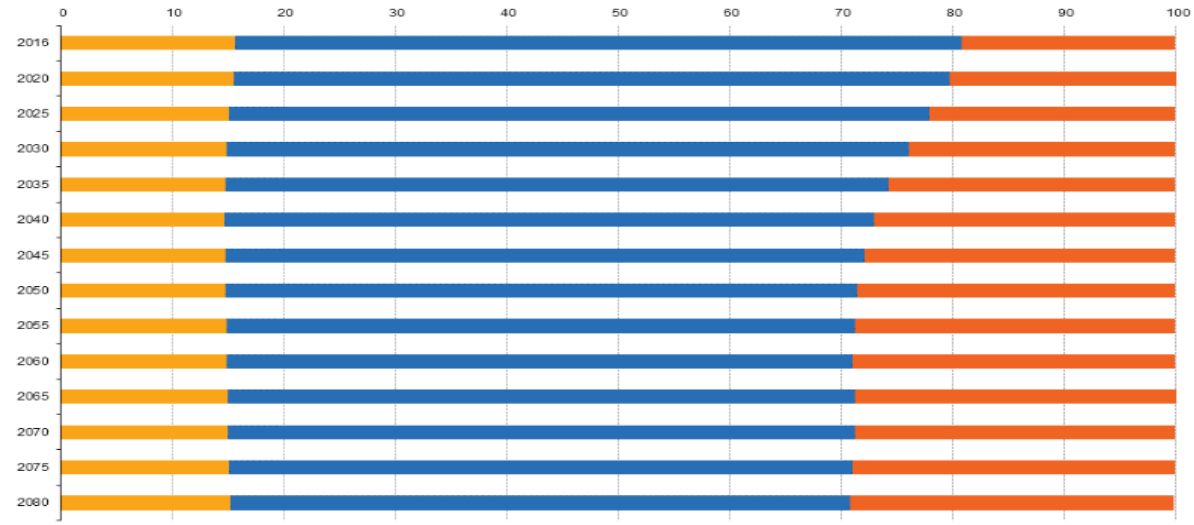

Figure 3 Age structure of population, EU 28- development 2016-2080 (Source: https://ec.europa.eu, 2018)
Key to the picture: Age structure of population, the EU's 28 development from 2016 to 2080: yellow stripes (0-14 years of age), blue stripes (the population in working age 16-64), orange stripes (65 and over).

WHO considers the population aging as the main reason of changed aetiology in population dying, what is not the result of infectious diseases, but the result of non-communicable diseases (Suzman et al., 2011).

The following graph illustrates the evolution of global population structure, where is visible the state in 1950, when the population of children clearly exceeded the adult population, but by 2050 is expected absolutely opposite ratio in population scale.

Economic prices as well as the social costs are rising steadily together with the development of chronic diseases such as cardiovascular diseases, diabetes, various types of oncological diseases what can considerably influence complex economic results. (Global Health and Aging – WHO, NIA, NIH, U.S. Department of Health and Human Services, 11-7737 October 2011, retrieved from : https://www.who.int/ageing/publications/global_health.pdf).

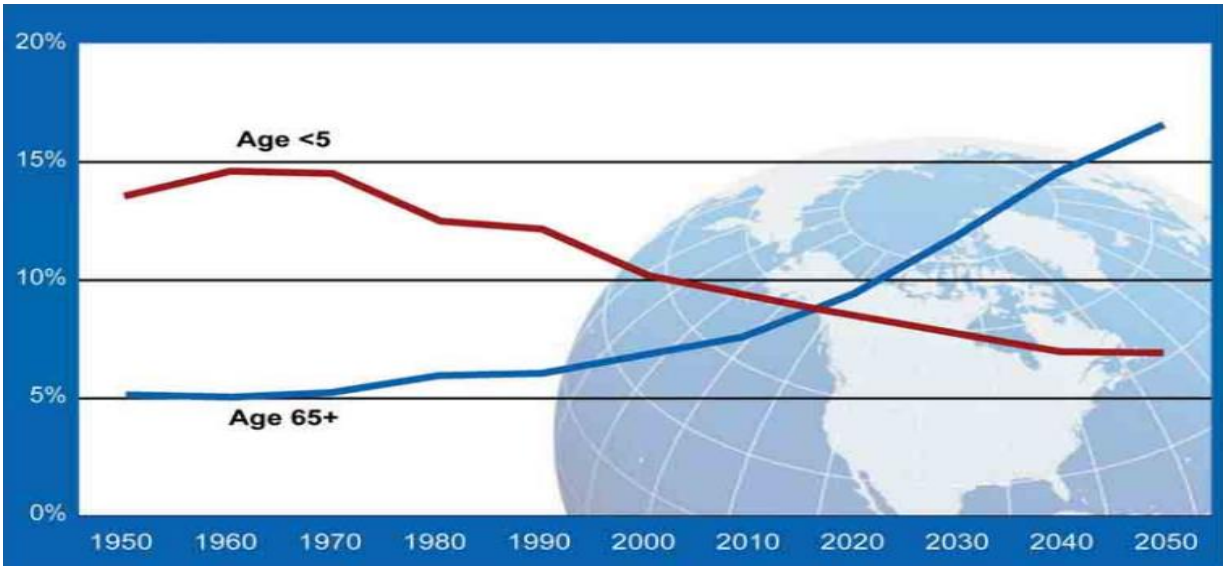

Figure 4 Development of global population 1950 – 2050 (Source: United Nations. World Population Prospects: The 2010 Revision. Available at: http://esa.un.org/unpd/wpp in Global Health and Aging – WHO , NIA, NIH, U.S. Department of Health and Human Services, 11-7737 October 2011, retrieved from : https://www.who.int/ageing/publications/global_health.pdf)

The aging index in Slovakia is expected to exceed the threshold of 100 before 2025, it means that for the first time in the history will be the population in productive age over 16 higher than the population in the reproductive age (Blaha, Vaňo, 2007). In 2025, the male aging index will be 102, and with post-productive women it will be more than 150 in 100 women in pre-productive age (Blaha, Vaňo, 2007). The oldest people share over 80 will increase by more than one percentage point to 3.7% by 2025 (Blaha, Vaňo, 2007). The population aging in Slovakia will be one of the most intensive ones within the whole European Union (Blaha, Vaňo, 2007).

WHO notes that in 2008, 57 million of total deaths, were 63% representing 36 million that were caused by chronic diseases such as cardiovascular diseases, diabetes, cancer and chronic respiratory diseases, while worldwide is assumed growing of the annual proportion of deaths due to chronic diseases (WHO, 2010). In 2016, from the total amount of 56.9 million of deaths, 40.5 million (71%), were caused by chronic illness (https://www.who.int/gho/ncd/mortality_morbidity/en/, retrieved: 3.2.19 - 23:25).

The following graph (2012) reflects graphic presentation of the worldwide deaths and proportions of aetiology, where the source of information and graphic presentation was taken from the publication: Global Status Report on Non-communicable Diseases 2014 ISBN 978 92 4 156485 4, WHO 2014.

The graph shows the causes of death in the population and the deaths of chronic diseases.

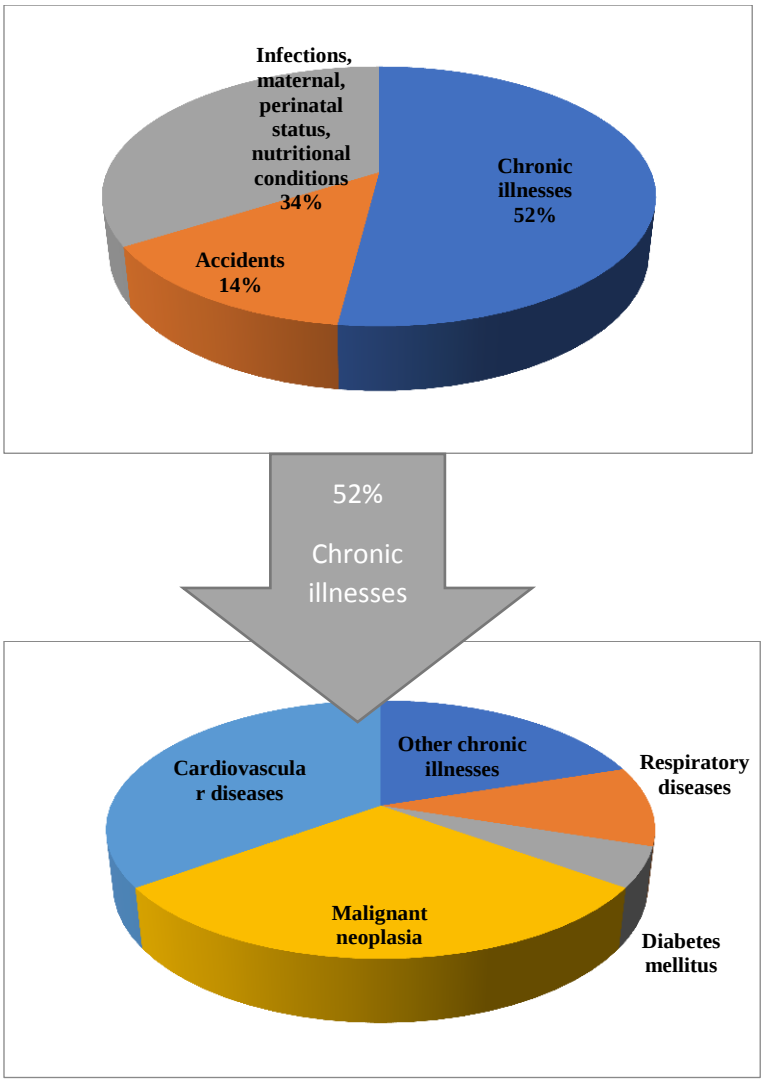

Figure 5 Proportion of worlwide deaths based on aethiology - year 2012 (WHO, 2014).

The effects of diseases on human life can be quantified by the means of DALYs, which means Disability Adjusted Life Years, WHO (2018) defines them as the sum of years of life lost due to premature death and the sum of lost years of productive life due to disability (https://www.who.int/mental_health/management/depression/daly/en/).

DALYs is one of the techniques used for economic evaluation in the health sector with one essential goal - to improve the efficiency of resources allocation (Babeľa, 2008).

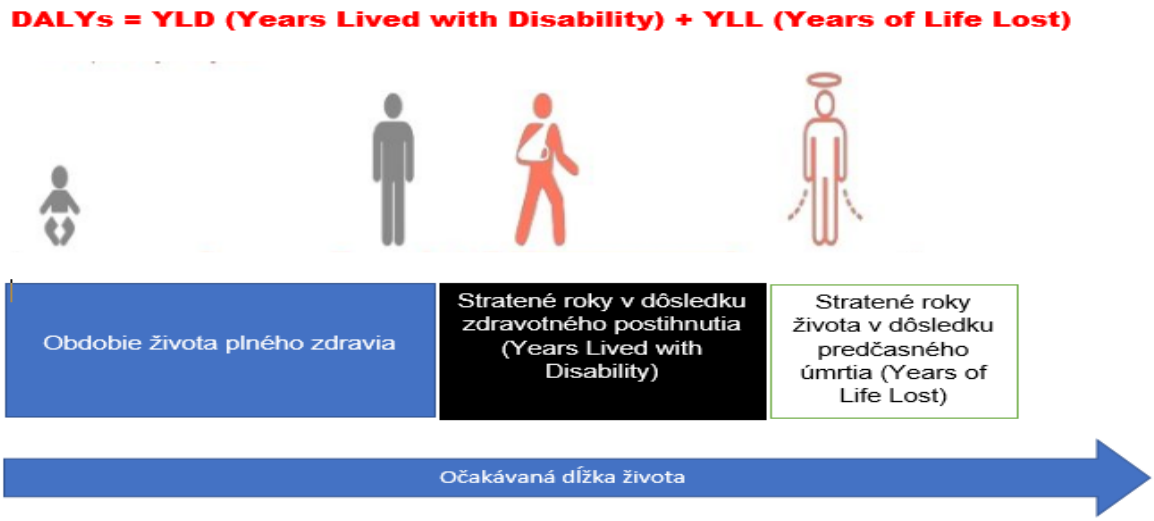

Figure 6 DALYs – explanation (modified by http://www.publichealthnotes.com/daly-disability-adjusted-life-years/ - retrieved 10.02.19, 10:05)

Based on the study on Global Burden of Disease from 2010, Ondruš et al. (2015) states that 23.1% (574 mln. DALYs) attributed to the global burden of diseases in people older than 60 years. The biggest contributor in the group of population was created by cardiovascular diseases (30,3%), then malignant diseases (15.1%), chronic respiratory diseases (9.5%), musculoskeletal diseases (7.5%) and neurological and mental diseases (6.6%).

The effects of aging connected with the quality of health care should be viewed through the optics of education. Stareček et al. (2018) reports the consequence as the low number of applicants for higher education, and then limited qualified staff for future. Jurenka et al. (2018) literally states that secondary and high school students encounter the exponential lack of students´ interest. Connected with this, it is necessary to realize that many times the structure of Slovak school graduates does not correspond to the market needs (Stareček et al., 2018).

Aim of the work

As it was already outlined, the number of post-productive population has been increasing, and also the prevalence of chronic illnesses. Known is that pain and poly-pharmacotherapy are the basic manifestations of old age diseases, where analgesics are the essentials. The consumption of drugs is the impact of age associated with poly-morbidity, manifested as the economic burden not only for the health system but also for the patient himself. Connected with that were analysed the tendencies of hospitalization in the palliative care wards and trends in the consumption of analgesics prescribed by geriatrics.

Methodology

Analysed was the consumption of 21,302 most common diagnoses in the hospitalized patients at palliative care wards in the period from 1/2016 to 12/2017. The data were based on the request provided by Všeobecná zdravotná poisťovňa, a.s. (health insurance company).

In the trend analysis was used APC (annual percentage change indicator), and for statistic analysis was used IBM SPSS Statistics. The indicator of annual percentage change was calculated as follows: $\mathbf{APC = x^1 * 100 / x^2 - 100}$, where x^1 is the number of hospitalized patients in the palliative care ward in 2017 and x^2 is the number of hospitalized patients in the palliative care ward in 2016.

Further was analysed the consumption of 12,888 of the most commonly prescribed analgesics by geriatrics in the period from 1/2016 to 12/2017.

The annual percentage change was calculated as follows: $\mathbf{APC = x^1 * 100 / x^2 - 100}$, where x^1 is the number of prescribed analgesics in 2017 and x^2 is the number of prescribed analgesics in 2016.

Results

Table 1 Amount of hospitalized patients (n) in palliative ward with selected diagnoses (n = 21,302) by period 2016 - 2017 and APC (%)

Selected diagnoses	**2016** (n)	**2017** (n)	**APC** (%)
Subjective and objective symptoms, abnormal clinical and laboratory findings	**234**	**258**	**10,3**
Breathing disorders	48	31	**-35,4***
Abdomen and pelvis pain	21	17	-19,0
Somnolence, sopor and coma	138	179	**29,7***
Non-classified shock	9	14	55,6
Injury, poisoning and some other external causes	717	795	**10,9***
Rib, sternum and thoracic spine fractures	40	47	17,5
Lumbar spine and pelvis fracture	122	146	**19,7***
Shoulder and arm fracture	43	32	**-25,6***

Femur fracture	351	392	**11,7***
Injuries affecting multiple body parts	33	15	**-54,5****
Complication caused by inner ortho prosthesis, implant or transplant	45	75	**66,7****
Late consequences of head injury	13	24	**84,6****
Late consequences of lower limb injury	24	10	**-58,3****
Infectious and parasitic disease	64	56	-12,5
Tumours	131	101	**-22,9***
Melanoma and other skin malignant tumours	38	33	-13,2
Malignant tumours of mesothelium and soft tissues	23	18	-21,7
Benign tumours	19	21	10,5
Mental and behavioural disorders	3 639	3 472	**-4,6***
Schizophrenia, schizotypal and delusional disorders	11	11	0,0
Nervous system diseases	38	28	**-26,3***
Circulatory diseases	423	418	-1,2
Chronic ischemic heart disease	247	259	4,9
Cardiac arrest	28	33	17,9
Other cerebrovascular diseases	138	116	-15,9
Respiratory diseases	141	157	11,3
Influenza and pneumonia	116	137	18,1
Other lung diseases	10	9	-10,0
Other respiratory system disease	12	6	-50,0
Skin and subcutaneous tissue diseases	97	63	**-35,1***
Musculoskeletal and connective tissues	38	37	-2,6

*p < 0,05; ** p < 0,001

In 2017 was found the significant decrease in hospitalized patients in palliative care wards with the diagnoses as follows: tumours (APC -22.9%), mental and behavioural disorders (APC -4.6%), disorders of nervous system (APC -26.3%), skin and subcutaneous tissue diseases (APC -35.1%), respiratory disorders (APC -35.4%), shoulder and arm fractures (APC -25.6%), multiple area injuries (APC -54, 5%) and later consequences of lower limb injuries (APC -58.3%), further was found significant increase in hospitalized patients with the diagnoses as follows: somnolence, sopor and coma (APC 29.7%), injuries, poisoning and some other external causes (APC 10.9%), spinal and pelvic fracture (APC 19.7%), femur fracture (APC 11.7%), complication caused by inner ortho prosthesis (APC 66.7%) and after effects of head injury (APC 84.6%) (Tab 1).

The most common diagnosis in hospitalized patients in the palliative care ward were mental and behavioural disorders (2016: n = 3,639 of hospitalized patients; 2017: 3,472 of hospitalized patients) with a significant decrease in APC in 2017 by -4.6% (Tab.1)

Tab. 2 Analysed analgesics and variables 2016 – 2017

Analysed analgesics and variables		**2016**	**2017**	**APC** (%)
Acetyl-salicylic acid	Prescription of analgesics by geriatrics (n)	3 618	3 321	**-8,2***
	Average yearly surcharge by a patient for 1 patient (€)	1,14	1,40	**23,1***
	Average yearly surcharge of insurance company for 1 patient (€)	2,00	1,73	**-13,6***
Diclofenac	Prescription of analgesics by geriatrics (n)	307	298	-2,9
	Average yearly surcharge by a patient for 1 patient (€)	1,70	1,75	3,3
	Average yearly surcharge of insurance company for 1 patient (€)	2,11	1,97	-6,7
Codeine	Prescription of analgesics by geriatrics (n)	72	72	0,0
	Average yearly surcharge by a patient for 1 patient (€)	2,27	2,47	9,2
	Average yearly surcharge of insurance company for 1 patient	0,88	1,05	**20,1***
Metamizole, sodium salt	Prescription of analgesics by geriatrics (n)	2 175	1 916	-11,9
	Average yearly surcharge by a patient for 1 patient (€)	0,53	1,09	**104,7****
	Average yearly surcharge of insurance company for 1 patient (€)	2,45	1,95	**-20,5***
Nimesulide	Prescription of analgesics by geriatrics (n)	137	133	-2,9
	Average yearly surcharge by a patient for 1 patient (€)	3,30	3,25	-1,2
	Average yearly surcharge of insurance company for 1 patient (€)	1,55	1,56	0,3
Tramadol	Prescription of analgesics by geriatrics (n)	420	419	-0,2
	Average yearly surcharge by a patient for 1 patient (€)	1,01	1,12	11,8
	Average yearly surcharge of insurance company for 1 patient (€)	8,73	8,55	-2,0

*p < 0,05; ** p < 0,001

Discussion

As mentioned at the beginning, the population has been aging, increases the prevention of chronic diseases in the context of increasing amount of productive age population. Palliative care is the part of care for vulnerable population. Dementia plays a significant role in palliative care for geriatric patients (O'Brien, 2013).

In our sample dominated mental and behavioural disorders in the aetiology of patient care at palliative care ward, in average it reached up to 16.6% of hospitalizations in the reported period. Foreign literature indicates that up to 40% of all deaths in the USA appear in sanatoriums, where death by itself is not a psychiatric diagnosis, but over 59% of terminally ill patients with cancer had depressive syndrome developed (Bailyn et al., 2003). Allegri et al. (2006) reports that geriatric age is the risk for the development of dementia, where the disease affects the

individual, family, carers and whole society from social and economic view.

The prevalence of cardiovascular disease in the elderly is increasing as the natural pathologic mechanisms of particular diseases.

In our sample, during the monitored period, were 4.78% of all hospitalizations due to cardiovascular and respiratory diseases, the most of the cases were due to cardiac failures (1.97% of all hospitalizations in the monitored period), chronic ischemic disease (1.19%) and subsequently due to vascular diseases of the central nervous system. Thus, cardiovascular diseases significantly burden not only the patients themselves but also their families in the context of anxiety, depression, physical disability and social harm due to health impairments, problems with symptoms and complex care regimes (Braun et al., 2016).

Palliative care is defined as patient and family centred care that optimizes the quality of life associated with health, anticipation, prevention and treatment of suffering, that should be integrated into the care of all patients with advanced CVD and stroke at an early stage of their disease (Braun et al., 2016).

Fractures are a common problem in elderly patients, a 50-year-old woman has a 40% chance of spinal fracture in her life. The incidence of vertebral fractures is 10 times more common compared to femoral fractures, the vertebral fragments are often observed to occur without a fall history, but femoral fractures are often associated with falls (Tsuda, 2017).

The incidence of vertebral fractures increases in women over 50 years of age, and the same trend as the prevalence of osteoporosis (Tsuda, 2017). On the contrary, the average age for proximal fractures of the femur is about 80 years of age and over 75% of femoral fractures occur in individuals over 75 years of age (Tsuda, 2017).

The femur injuries and fractures (about 3.5% of all hospitalizations in the reported period), head injuries (in average 0.12% of all hospitalizations in the monitored period) and complications caused by inner ortho prostheses (in average 1.7% of all hospitalizations in the monitored period), implant and transplant were other important elements of palliative care (on average 0.56% of all hospitalizations in the monitored period).

Fall prevention and prophylactic treatment of osteoporosis is the base for prevention and safeguarding of active aging.

The aftercare and rehabilitation of patients after a hip fracture is connected with different procedures aimed to achieve and maintain maximum functional capacity and

quality of life, as the prerequisite for optimal functionality with the maximum independence of geriatric patients (Radosavljevic, 2014).

In the case of monitoring the prescription of analgesics, we can state as follows:

The average annual surcharge of the patient was significantly higher for the surcharge for acetylsalicylic acid and metamizole, the average annual surcharge of the insurance company for one patient was significantly higher for the codeine surcharge and significantly lower for the metamizole surcharge in 2017 compared to 2016.

Sharing the healthcare costs is the significant adherence aspect of the patient treatment and thus the overall quality of life (Toyama et al., 2004).

Metamizole is a frequently prescribed medication for geriatric patients primarily intended for the treatment of pain, followed by atypical opiates and then NSAIDs.

The average yearly surcharge of a patient and the insurance company was not only influenced by categorization, but also by other factors such as price, margin, place (pharmacy) where the patient bought the analgesics, seasonality of prescription, adjusted amount of surcharge and others.

Affordable as well as adequately targeted therapy for elderly patients is the essential to improve their quality of life and reduce poly-pragmasia and poly-pharmacotherapy.

Conclusion

The aging of the population brings a great challenge to ensure the adequate financial, human and other material resources to ensure the sufficient economic productivity and promote the status of active aging in the context of human dignity and fundamental principles of humanism that should not disappear from our society.

Based on the above mentioned can be seen, that the aging of population requires the training of fully-fledged social and health care workers, who dispose multi-dimensional knowledge of social work, public health, medical unions, nursing, as well as the law and rights to tackle the issues in the complex context to gain the mentioned goals.

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Kontakt na autora:
MUDr. Richard Didič
E-mail: didic.richard@gmail.com