Longer life – the triumph of our time, yet a pressing problem for our public health care systems and politics

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Abstract: With the discovery of infectious agents in the last quarter of the 19th century, with the later developments in all levels of medicine and with numerous great social accomplishments, life expectancy began to steadily increase like never before in the history of human development. The important details for this will be presented based on the situation in Austria. The consequences of this entirely positive development, which are as a result of the increase in old age, will be discussed and the urgent need for lasting solutions presented.

Keywords: aging, health care, life, life expectancy, politics
It has now been thirty years since we carried out an oral survey campaign among the local people on the street. This survey ran over a number of weeks, had no pre-defined target group and the only question was: “What do you see as the greatest progress of our time?” The result: not one of the those asked even mentioned that every newborn nowadays has considerably higher chances of reaching old age than was the case just three or four generations ago. Was this a disappointing result? No! We have all simply gotten used to these new times, drifting along with the current of today. We take for granted all of these new technical, scientific and industrial triumphs around us, triumphs that have radically changed everyday life and allow us, on average, to live to be much older than our forefathers. This is the first time since man came into being that such progress has been achieved, and we know exactly what started the ball rolling – the fundamentally new medical research discoveries around 1875.

The facts: About two million years ago, when our ancestors were still using stone tools, and much later, when they learned how to make and use fire, the life expectancy of a newborn must have been approximately twenty five years (1). This very plausible figure is based on the analysis of skeletal remains and takes into account the circumstances in which these people lived: the daily fight for survival, with its extreme dangers and stress, the ever-present threats presented by nature and hunger and the resulting diseases.

The later development of “language” transcended communication through sounds and gestures; a clear intellectual revolution in the broader development of man began, seen in the many cave paintings, jewellery, figures and burial rites that have since been uncovered. With the beginning of agricultural and livestock farming, with the move to settlements, with the establishment of the larger settlements, cities, kingdoms (c. 10,000 BC) everything changed. These changes even caused a considerably increase in the life expectancy of a newborn, although it was simultaneously decreased by the new dangers that this way of life brought with it. As a result of so many people living in such small spaces, the time of the epidemic, the king of all infections, began.

The life expectancy of a newborn at the time of the first great civilization stood at 35 years. This average time span of a human life from the date of birth did not change until the middle of our eventful modern times, the nineteenth century, an entire thousand years later. However, epidemics and infections were still among us and had remained almost unchanged. Cholera, for example, was one such mass-epidemic which was rampant in nineteenth century Europe.

It was then, in the nineteenth century, that two particular scientists critically influenced the further development of medicine and, as a result, life expectancy in all developed countries. In his work which he had started in Paris in 1856, Louis Pasteur discovered that certain microorganisms cause fermentation and decomposition; something that we cannot even see with the naked eye can be so significant. Among other work, he later developed a vaccination against rabies. Robert Koch’s research on “infections”, published in 1876, proved that anthrax bacillus taken from infected animals, isolated and cultivated in an artificial medium could infect healthy animals. It all sounds so simple today, but yet this research changed the world. This new knowledge changed medicine completely over the course of the following years; the possibility to identify infections, to fight infections and prevent infections. This paved the way for the longer life we live today. Fighting epidemics and infections, early recognition, prevention and, later, direct treatment.

The serum therapy for diphtheria, introduced by Emil von Behring, was one of the first major successes in the treatment of a disease which, until then, had been deadly for so many children. Surgery flourished with the new concepts of disinfection, sterilisation and “sterile” working conditions on and around the operating table. Theodor Billroth in Vienna, Ernst von Bergmann in Berlin and an entire new generation of surgeons laid the groundwork, in a very short space of time, for the modern surgery of today.
The knowledge that created “modern” medicine had far-reaching effects on all aspects of medicine, stretching beyond the boundaries of problems with infection. At the same time, the revolutionary success of social change must be highlighted within this context. The following graphics and numerical data clearly show the trends in relation to today’s life expectancy. To start, a general introduction to the term: “life expectancy” deals with statistics on the expected number of years between a certain point in a person’s life and their death. This is generally calculated using a life table, based on empirical data of death rates for the past, and on model assumptions for predictions of future mortality rates. In principle, any point of a person’s life can be chosen from which the remaining number of years can be ascertained, but normally it is taken from birth. The most commonly given life expectancy is, therefore, that at the point of entry into life, the average life expectancy at birth (2).

The calculated figures are therefore average values, which, in relation to the life expectancy of an individual, could be higher or lower depending on that individual’s fate. (Fig. 1)

Figure 1.: Life expectancy at birth in Austria
1. ábra: Várható életartam születéskor Ausztriában
These results clearly show that the cause of low life expectancy at birth lay in the first, or at least the early, years of life. When people survived these early years, their life expectancy increased, even around 1870. It goes without saying that, even then, there were old and very old people, although the great difference between then and now is that there were much fewer older people then than now; in the past, few people lived to old age, but nowadays our chances of living to old age are incredibly high. The following set of statistics provides evidence of this, showing in which age bracket the most fatalities occur, expressed in terms of the percentage of all those who died in that particular year (4). (Table I, II)
I. TÁBLÁZAT: A halálozások száma Stájerországban 1887-ben 36,254
TABLE I: Number of deaths in Styria in 1887: 36,254,
of which:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Age Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.8%</td>
<td>died between birth and the 5\textsuperscript{th} birthday</td>
</tr>
<tr>
<td>4.2%</td>
<td>died between the 5\textsuperscript{th} and 15\textsuperscript{th} birthdays</td>
</tr>
<tr>
<td>5.7%</td>
<td>died between the 15\textsuperscript{th} and 30\textsuperscript{th} birthdays</td>
</tr>
</tbody>
</table>

As the figures show, 43.7% of all deaths occurred under the age of 30 and the number of deaths under five years of age accounted for approximately one third of all deaths in 1887.

If one compares these figures to the same calculations for 2005, based on figures provided in (2), one sees the following:

II. TÁBLÁZAT: A halálozások száma Stájerországban 2005-ben 75,199
TABLE II: Number of deaths in Styria in 2005: 75,199,
of which:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Age Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.52%</td>
<td>died between birth and 5\textsuperscript{th} birthday</td>
</tr>
<tr>
<td>0.15%</td>
<td>died between 5\textsuperscript{th} and 15\textsuperscript{th} birthdays</td>
</tr>
<tr>
<td>1.11%</td>
<td>died between 15\textsuperscript{th} and 30\textsuperscript{th} birthdays</td>
</tr>
</tbody>
</table>

The drastic positive change between these two sets of data is the drop in the death rate in early life. This is the main reason why we can estimate life expectancy for all ages, as early as at birth, today: in comparison to earlier times, it doesn’t change much at 30 or 60 years of age. These figures should, however, be seen as sound probability which depends on the personal fate of the individual, rather than a certainty.

The next set of tables provides an overview of the causes of death in the year 1872 in Styria. The figures are taken from the publication cited above (4, p.20). They are not exactly comparable to today’s statistics, but their main results are very interesting. Of particular note are the details about manner of death published by the medical officer. These precise details are certainly useful for a comparison.

III: TÁBLÁZAT: Halálozások száma Stájerországban 1872-ben
TABLE III: The number of deaths in Styria in 1872
Based on 100,000 inhabitants, there were 2,342 deaths in Styria in 1872. The following information shows the given cause of death (in percentage)

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debilitas vitae, infectious disease</td>
<td>50.4%</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td></td>
</tr>
<tr>
<td>Inflammatory disease of the respiratory system</td>
<td></td>
</tr>
</tbody>
</table>

The figures clearly show that death rate before or during birth, along with disease, for which Robert Koch found the key just a few years later, were extremely significant because around 40% of all deaths were caused by infectious diseases. If we add to this the “debilitas vitae of newborns” (10%), these two causes of death add up to over 50%.

When this data is compared to exact data from 2005, we see the following (3)
TABLE IV: The number of deaths in Austria in 2005

Based on 100,000 inhabitants, there were 913.23 deaths in Austria. Cause of death as a percentage of all deaths:

<table>
<thead>
<tr>
<th>Infectious and parasitic diseases</th>
<th>together: 2.8%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td></td>
</tr>
</tbody>
</table>
| Cause of death as a percentage of all deaths:
| Infectious and parasitic diseases | together: 2.8% |
| Pneumonia                        |                |
| Cardiovascular disease            | 43.3%          |
| Malignancies                      | 25.4%          |

Infectious disease as a cause of death has sunk to a minimum. Today’s main causes of death (cardiovascular disease and malignancies, 68%) perhaps signal an end to the series of causes of death we have experienced throughout the years. Though consistent prevention and the invention of new cures will improve this figure, this particular cause of death will remain present. Death is a biological fact; there will always be “causes”.

To finish up, a brief look at infant mortality in Austria (3)

TABLE V: Infant mortality in Austria

<table>
<thead>
<tr>
<th>1871/75</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>287.2</td>
<td>4.2</td>
</tr>
</tbody>
</table>

These figures hardly need to be explained. The fact that infant mortality has so drastically changed for the good, is the main reason that we have managed with the pension system we have had up to now, despite today’s considerably lower birth rate. We owe this progress to the gynaecologists and paediatricians, the efforts in the premature babies wards and immensely improved care for pregnant women and children (see “Mutter-Kind-Pass in Österreich seit 1975” (5)).

One such positive development was certainly not achieved globally, however. Many countries simply did not have the facilities to achieve these standards because of factors such as: lack of hygiene, unclean drinking water, insufficient nutrition and a lack of medical care. This was the case here in Austria in pre-industrial times and is still the case today in many parts of the Third World (2). According to a survey on life expectancy in the EU in 2006 (6), Austria stood in sixth position, with a life expectancy of 80 at birth for both men and women.

The steps which have led us to where we are today followed the same basic trends as in all successful countries: first, the decisive victory over epidemics and infections – surgery broke all of its previous boundaries; later, preventative vaccinations, the discovery of new medicines and treatment methods – the time of the antibiotic begins; and finally, the successes of intensive prevention, increased health checks and new treatment methods for patients in their later years (see also 7).

The bitter core of this immensely positive development, where life is, on average, much longer than before, lies in a series of facts, which are becoming increasingly relevant. A few of the more important are listed in brief here, but are then explained in more detail:

The normal, physiological changes in bodily constitution in later years are coming more to the fore for a lot of people because people are living longer.

Diseases which are more common in later years are becoming more frequent for the same reason.

The drastically changed situation in relation to health in later years (i.e. after occupational activity)
means that a swift change in social legislation is necessary. Doctors, hospitals and health insurance companies also need to adjust sufficiently to this new situation.

The influence of this change on the general idea of “family” must be kept in mind when formulating these new plans

1. We have known about these normal anatomical and physiological changes for quite some time. Prof Walter Krause was professor for topographical anatomy at what was then known as the Vienna Faculty of Medicine. He held a series of lectures on the themes of age and ageing in 1977 (8) which gave an overview of and summarized these changes. He also provided preliminary clarification that the normal changes in the body in relation to age are therefore entirely “physiological”. The changes and occurrence of degeneration can, to a certain degree, be influenced, if not completely stopped, through individual positive disposition, a “healthy lifestyle” and by making use of the available preventative examinations from an early age and continuing into old age.

2. Over 43% of all causes of death today are related to cardiovascular disease, which, for its part, stems mostly from arteriosclerotic problems (see Table 4). We can really only begin to truly appreciate life when we take a look at the system that sustains life itself. The main requirement for life is a functioning permanent and adequate supply to all organs and parts of the body, and this can only be achieved when the heart’s pumping capacity is functioning and when a system of elastic blood vessels running through all parts of the body sustains every minute of our life. As well as this, there are the various symptoms caused by lack of supply to the central organ controlling every action in our day-to-day lives: the brain. The symptoms caused by lack of supply make it necessary for many people to go into care. Although one can have excellent, clearly life-prolonging results in preventing the development of arteriosclerosis and cardiovascular diseases simply through a generally healthy lifestyle, a lot of movement, sensible eating and drinking habits etc. and preventative examinations, this doesn’t change anything in relation to basic meaning of this group of diseases except to postpone death.

Figure 3 shows that today’s second most common cause of death, cancer, does not reach its peak value in old age, but rather in later middle age. The fight against cancer today is primarily based on avoiding everything which has been shown to be, or is thought to be, carcinogenic. The earlier this disease is diagnosed, the better the chances for successful treatment. However, new developments can certainly be expected (9).
Of particular importance in today’s care of the elderly problems are the degenerative diseases of the brain, which have become more frequent over the last number of decades. However, these are in no way new diseases; they have been known about for quite some time. The German psychiatrist, Alois Alzheimer, for example, published his research of many years on the subject of senile dementia in 1906, while a paper on Parkinson’s disease by surgeon James Parkinson was published in London in 1817.

The treatment options for Alzheimer’s today are very unsatisfying and those who have the disease often live for many years with the slow, ever-increasing deficits. Despite this, the personal bond between people remains in some form, often only recognizable to those closest to the person. A particularly interesting aspect of long-term, full care with this disease, which transcends practical problems with food and hygiene etc. is close emotional contact, or in the case of close family members, the word “love” is perhaps more suitable.

From the point of view of care for sick elderly people, today’s circumstances are not even comparable to those in earlier times. That’s not to say that such typical diseases of aging didn’t exist before, but the number they affected was considerably lower because of the lower life expectancy. Familial relationships were also considerably different, though that doesn’t necessarily mean that they were better. In any case, the problem of care for our elderly fellow citizens has today become a key socio-political issue.

3. Everything that we do today to create a secure retirement for the ever-growing social stratum of citizens at pension age is based on the main features of the excellent social accomplishments of more than 100 years ago: a working population with a wide base paying steadily into a pension system over a long period of time provides the retired worker with a pension. The reasons that this doesn’t function as well today as it did then are quite easy to explain. The base of young citizens has become increasingly smaller, the payment time is shorter, the number of people insured to retire earlier has dramatically increased and the average length of time for receiving a pension has become much longer! These ratios show, without the use of long drawn-out calculations, precisely what today’s problems are.
In addition to this, although expenditure on the health sector in these last 100 years has skyrocketed, the issue of “care for the elderly”, to the extent in which it is present today, simply did not yet exist. All in all, this is an issue which puts every politician today in the difficult situation of trying to free up expenditure that is extremely difficult to free up. Young people want to live well and have good employment opportunities, without always having to think about age and aging. The later years come in due time and one wants to make the most of this time, fresh and adventurous, free and without daily commitments. But unfortunately it cannot continue to be this way without changing the system to suit today’s needs. Politically, this is, without doubt, an unpopular obligation of our time, also because no matter how one approaches the problem, changes in today’s habits will bring new, unforeseen aspects to the problem. This is an issue which demands immediate action!

This is an issue which transcends everyday politics and it is necessary to make the people aware of the very heart of the problem, even though there will possibly be opposition to the idea. There is no magician who can simply brush this under the carpet; these facts are simple and compelling and the public needs to be made aware of them and their consequences. When we see these consequences as the “bitter core” of today’s life progress, then the bitter part of it only remains bitter if we fail to see where we stand today.

4. When we think that, not so long ago, caring for older relatives was more or less the responsibility of extended family in many countries, we see quite clearly what has changed. Long ago, when retirement benefits were still rarities, when women were dependant on their husband’s job, when health insurance as we know it today did not exist – that was when support in old age was simply a necessity. There is, however, no need for us to return to those days (10, 11)). We can forget the myth of the “good old days”; today we have a totally different set of developments and the problems that they bring.

Over the last century, women have broken boundaries in their careers, in their independence and in making their own decisions about their life, in particular about their life as a “woman”. It has now become reality that both sexes are (finally) equal on all levels. What remains, however, are the basics of human biology in relation to procreation. We must do everything possible to facilitate women and ensure that they are not at a disadvantage in the job market when it comes to the topic of “pregnancy”. There are now laws in almost every country, but the code of practice still seems to differ from job to job sometimes with hindered career progress, little appreciation, a lack of help particularly during the child’s first years etc. Despite this, there will never be complete equality between men and women in relation to “life processes”, even in the distant future. Yet this is something wonderful for both sexes: The woman as an equal partner is, without doubt, a truly long overdue advancement of today’s society, however, the ability to develop a new person in the mother’s body is, and will remain, reserved for women.

When we speak of state help in overcoming the problems brought on by an aging population, we can’t forget that it is necessary to further improve the basics. The aforementioned changes over the last century have shifted the idea of “family” as we knew it in the past. Young people want to go after the best job opportunities. Contact, even in the best situations, is becoming more difficult because of distance. The consequences of the modern idea of the family will become more visible in the future with the problems of care for the elderly.

Conclusion

We have determined that today, for the very first time since man has existed, we can generally expect a much higher life expectancy than people two or three generations ago. New territory in medical research in the last third of the nineteenth century, an entirely changed social lifeworld and incredible developments, have made this first-time success possible. This trend can certainly
continue in the future but, from the current point of view, the highest limit, 120 years, will stay the same and will be reached by very few.

We need to find a solution for the negative aspects and the new problems brought on by increased life expectancy in a modern state in today’s lifestyle. The group of people in old age in relation to the population as a whole has steadily increased, and with that, the number of people who need care. The social structure has changed. The basic family institution has changed. Women’s position in society has changed. Raising children has changed. The requirements of the state have changed. The notion of an age to which it is worth living has changed. What we used to associate, in a narrower view, with the state’s public health system, has changed and developed with this new situation. Care in old age has become a pressing issue of our time. The politicians who plan and implement effective changes for now and for the future have become the hope of the future. They certainly don’t have it easy, but this fundamental progress simply cannot be ignored.

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Összefoglalás: A fertőző agensek felfedezése a XIX. század utolsó negyedében, az orvostudomány minden szinten történő későbbi fejlődése és számos nagy szociális eredmény révén, az élettartam folyamatosan nőtt, úgy, mint soha azelőtt az emberi felődés történetében. Ennek a lényeges részleteit mutatja be a szerző Ausztria példáján. Tárgyalja e teljesen pozitív fejlődésnek az öregkor meghosszabbodásában mutatókó következményeit, és tartós megoldás szükségességét sürgeti.

Kulcsszavak: öregedés, egészségvédelem, élet, élettartam, politika

(Szerk :Prof Mőse a Grazi Orvostudományi Egyetem Közegészségtani Intézetének az emeritus igazgatója. Szakmai életétől és működéséről az Egészség Tudomány LII évf. 2. számában a 74. oldalon adtunk összefoglalót)