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'Fair innings' in the face of ageing and demographic change

Abstract:

There are now 125 million people aged 80 and over worldwide, projected by the United Nations to grow three-fold by 2050. While increases in life expectancy and rapid increases in the older age population are considered positive developments, the consequential future health care burden represents a leading concern for health services. We re-visit Williams' 'fair innings' argument from 1997, in light of technological and demographic changes, and challenge the notion that greater longevity may impose an unfair burden on younger generations. We discuss perspectives on the equity-efficiency trade-off in terms of their implications for the growing over-80 population as well as society in general. This includes questioning the comparison of treatment cost-effectiveness in younger vs. older populations when using quality-adjusted life years (QALYs) and the transience of life expectancies over generations. While recognising that there will never be a clear consensus regarding societal value judgements, we present empirical evidence on the very elderly that lends support to a stronger anti-ageist stance given current increases in longevity.

Global ageing

The global population is ageing at an unprecedented rate. The numbers of senior elderly, 80 years and older, are increasing rapidly in the United Kingdom (UK) and internationally. Over-80s represent the fastest growing age group in the majority of high income countries (Office for National Statistics 2005, Mody, Miller et al. 2008). Recent UK estimates indicate that the age group over 90 years of age has increased steadily over the past three decades. In 1982, 3% of the population aged 70 and over were 90 or above; by 1992 this rose to 4%, by 2002 to 6% and in 2012 to 7% (Office for National Statistics 2014). In the United States (US), the number of centenarians has increased from 32,194 in 1980 to 53,364 in 2010 (U.S. Census Bureau 2012), and in the UK the number has risen by 73% over the last decade to 13,350 in 2012 (Office for National Statistics 2014). This rapid increase in the older age population represents a positive development but the consequences for health services is an important concern. Does greater longevity, and associated health and social care costs, impose an unfair burden on younger generations, justifying compensation for the young through the 'fair innings' argument?

The 'fair innings' argument

Alan Williams explored the concept of intergenerational equity in his 1997 'fair innings' paper (Williams 1997). The argument claims to be quantifiable and outcome based, while reflecting an aversion to inequality. Williams argued that every individual should have access to sufficient health care to provide them the opportunity to live a 'normal' span of years in good health, and anyone who lives longer than this is 'living on borrowed time'. While Williams acknowledged the importance of quality of life as well as length of life, fundamental to the argument is the 'normal span' which places emphasis on length. This arrangement, he suggested, could ensure a fair and efficient distribution of health care resources by focusing on the reduction of health inequalities over the life course. Being entitled to this 'normal' life span is central to the fair innings argument, suggesting resources may be allocated to a younger person over an older person who has already lived their 'fair innings'. The fair innings argument incorporates certain assumptions concerning what constitutes a 'normal' span of life and the role of health care in achieving this. We explore how the notions of a 'normal' life span, the idea of younger generations receiving more weight, and the role of health care in health have evolved over time.

What constitutes a 'normal' span of life?

Life expectancy is increasing. In the UK, life expectancy is now 79.1 years for men and 82.8 years for women (Office for National Statistics (ONS) 2016). The age at death for persons reaching the age of 80 years has increased rapidly, from 85 years for men and 87 years for women in 1990, to 87 years for men and 89 years for women in 2014 (Hazra and Gulliford 2017). Williams' argument means accepting that individuals now living to advanced ages may have exceeded their 'fair innings', while individuals not living to such an age may be viewed as having been cheated of a full life-span. Do we accept a positive definition of the

fair innings, including the biblical definition of 'three score years and ten', or should a normative definition, that may be revised over time, be preferred?

A positive definition of the fair innings could be grounded in the recognition that the human life span is biologically limited. However, due to numerous technological advances in medicine and improved living conditions, ageing processes are being delayed, which results in the extension of lifespans through better treatment and prevention of age-related and chronic diseases. Lifespans are largely limited by the technological capacity of innovation and the effective application of medicine (Farrant 2009), assuming the availability of such services and putting to one side accidental deaths occurring at any age. The role of technological gains in medical research change what we can now describe as a 'normal' life span. The number of centenarians is increasing rapidly and some research suggests that a life span of 115 years may not be an unrealistic expectation, contesting the assumption that human lifespans are fixed and unchanging over time (Wilmoth, Deegan et al. 2000, Blagosklonny 2010, Dong, Milholland et al. 2016).

If the 'normal' span of life is defined from life expectancy at birth, this poses problems in terms of equity considerations. Rapidly changing life expectancies over time do not allow for equal distribution of gains between generations. For example, life expectancy at birth of an individual born in 1947 would be lower than for someone born in 1992. The youngest benefit more from life expectancy gains while the oldest are subject to 'older' life expectancy figures. Younger people will also be healthier over the life course, potentially needing fewer resources to maintain good health. New epidemiological patterns are emerging with declining cardiovascular and respiratory diseases in over-80s (Hazra and Gulliford 2017), while age-related impairments and frailty are on the rise as we transition into this fourth stage of epidemiological transition, 'The Age of Delayed Degenerative Diseases' (Olshansky

and Ault 1986). Therefore, life expectancy has varying underpinnings and is not static but rather transient across generations, also varying at the individual level according to economic, social and political environments. Universal health care is underpinned by the key value of individuals receiving care based on clinical need and not ability to pay (Department of Health 2012). Therefore, we may consider it unjust to specifically favour younger individuals who have not yet lived their 'fair innings', as they will likely have a lower risk and arguably a lesser need for health services. By favouring the young, society would be likely prioritising those with lesser need which conflicts with the basic tenet of universal care prioritising need.

Should the concerns of younger generations receive greater weight?

The fair innings argument positions the young at an advantage over the old in the context of health care decision-making - a view that generally receives implicit public endorsement such as when young people are adversely affected by terminal disease. When examined more closely, the implication that extending life into older age is of less value than at younger ages, while possibly sound from an efficiency perspective, as the younger have more capacity to gain life years, is difficult to justify in social and ethical terms. This is exemplified in arguments that led to abandoning age-weighting of the disability adjusted life year (DALY). The Global Burden of Disease study investigators concluded, after much debate, that they 'should treat a year of healthy life as equal, irrespective of the age at which it is lived' (Murray, Ezzati et al. 2012). This recognises the 'dignity of man' (Pico della Mirandola 1956) even in very old age and the universality of rights to health and care (United Nations Human Rights 1976), but these ideas may conflict with efficiency concerns in the context of health economic evaluation.

The comparison of incremental cost-effectiveness ratios (ICERs), or costs per QALY, between an intervention for the elderly as compared to the young requires special consideration. Younger individuals will have more time to accrue incremental QALYs attributable to an intervention compared to the old. Therefore, incremental QALYs will be gained over a longer period than the same amount of incremental QALYs provided by an intervention primarily benefitting the old. This is particularly a concern for interventions with a fixed or short-term cost of treatment, but may be less problematic for chronic conditions where the incremental cost of the intervention may also continue to accrue for longer, like the additional life years lived by the younger person. This potentially creates inequities by age when using the QALY, and it is important that we consider these issues in our comparisons between the cost-effectiveness of interventions for younger vs. elderly groups when using QALYs in resource allocation decisions.

We must also examine assumptions about QALYs gained over the life course and the extent to which age itself contributes a decrement in utility values. Later years of life do not necessarily correspond to decreases in health and quality of life (Hazra, Dregan et al. 2015) as is often assumed. New evidence suggests that those reaching the advanced age of 100 years or greater may actually be healthier with lower prevalence of disease compared to those in their 80s and 90s (Hazra and Gulliford 2017), although this is likely due to a survival effect. The consequences of ageing may sometimes be difficult to distinguish from the effects of age-related diseases and the processes of dying (Ravindrarajah and Gulliford 2017).

The role of health care

The fair innings argument implies that good health may be promoted and protected over the life course through utilisation of health care. McKeown was one of the first to show that

health care was not a major determinant of historical declines in mortality (McKeown 1976). This view is popular in public health circles but is perhaps more difficult to sustain in the modern era in which medicine is making a substantial contribution to the reduction in mortality from infectious diseases, such as HIV (Weber, Ruppik et al. 2013), as well as cancer (Cancer Research UK 2017) and cardiovascular diseases (British Heart Foundation 2017).

Nevertheless, a high proportion of lifetime health care costs are incurred towards the end of life (Zweifel, Felder et al. 1999, Alemayehu and Warner 2004). These are likely to be associated with the management of terminal illness (House of Lords 2005-06, Round, Jones et al. 2015) and the type of medical care received at the end of life (Sato and Fushimi 2009). While ageing is generally assumed to be accompanied by greater health care expenditures that may burden younger generations, this assumption is questioned in the 'red herring' hypothesis. Zweifel et al. (1999) suggested that the proposed association of age with health care costs is a 'red herring'. In their analyses, health care expenditures depended on remaining lifetime and proximity to death rather than calendar age (Zweifel, Felder et al. 1999). Recent analyses also show that comorbidities and impairments in addition to death proximity are important mediators of age-related increases in health care costs, more so than age itself (Hazra, Rudisill et al. 2017). The costs of comorbidity are not generally associated with age in people who are not close to the end of life. Furthermore, the additional costs incurred in the last year of life decline with age. This empirical evidence concerning health care and costs is yet another reason we might think to shift our focus away from age itself when discussing resource allocation and the 'fair innings'. These new findings imply that the end of life and multiple morbidity may presently be managed more efficiently at advanced ages, perhaps as a result of choices made by patients, families and physicians for appropriate care. These can be emotionally sensitive moments, but by having more of these difficult conversations regarding the intensity of interventions at end of life,

quality of life and dignity at end of life might receive more attention through alternative courses of action. To quote Atul Gawande in 'Being Mortal', "...our most cruel failure in how we treat the sick and the aged is the failure to recognize that they have priorities beyond merely being safe and living longer; that the chance to shape one's story is essential to sustaining meaning in life" (Gawande 2014). At the individual level, issues of patient and family preferences regarding the acceptability of different treatment options may begin to assume greater relevance than comparative effectiveness and efficiency.

Discussion and concluding remarks

Current debate in the UK has focused on equity across income groups and social classes, however intergenerational equity and the trade-off between equity and efficiency has also begun to receive political attention. In the context of the UK's publicly funded universal health care system, an older person may feel a sense of ownership towards a system that they have likely spent years contributing towards funding. Those living to advanced ages may have incurred minimal health care resource use earlier in life, expecting to benefit more from the system in their older more vulnerable years of life. Living a 'fair share' of life may not imply receiving a 'fair share' of health care. Williams viewed the 'fair innings' argument as being concerned with a person's 'whole life-time experience', not just about their state at any particular age (Williams 1997). The universalist principle guiding the NHS requires that it provides a 'comprehensive service, available to all', irrespective of age, as well as other personal characteristics. This principle will usually trump utilitarian considerations. The demographic shift towards greater numbers living into older age should not alter this basic social contract agreed in most developed countries. While there is no clear solution to the equity-efficiency debate, our modern-day demographic deserves a stronger anti-ageist stance on one of society's largest challenges – managing an ageing population with increasingly limited resources.

In improving efficiency based on the fair innings argument by investing where health gains are greater, perilous ideas such as ‘denying treatment to elderly patients’ or ‘supporting rationing of health care by age’ are produced. The UK’s Equality Act of 2010 added age as a protected characteristic, but there may be a case for more research into the public’s values and judgments to reassess the priority afforded to specific population groups (Littlejohns, Sharma et al. 2012). As evidenced from NICE’s rulings regarding a higher ICER threshold for orphan drugs and the use of the cancer drugs fund, there is a clear departure from the ‘QALY is a QALY’ principle, in an expression of vertical equity (Paulden, O’Mahony et al. 2014). Perhaps greater improvements in health could have been achieved across a wider range of diseases, cancer included, if the fund’s £230 million was made available across the wider NHS (Aggarwal, Fojo et al. 2017). Why should the beneficiaries of rare drugs and cancer drugs receive special treatment while older people receive lesser priority for living out their ‘fair innings’? Other questions may include whether health care maintains health efficiently through sufficient prevention efforts or whether it is used more to treat emergent conditions that may shorten life at any age. Focusing more attention on value-based health care, incorporating patient views and reducing high cost drivers such as multiple morbidity may provide more efficiency gains than prioritising the young over the old. Perhaps this could include a move towards more emphasis on social care for older populations.

Alternative approaches to implicit incorporation of equity weights have been explored, such as generating estimates of ‘cost per equity-adjusted QALY’, but this process requires further development (Cookson, Drummond et al. 2009). It will take time and might be technically challenging if we want to appropriately reflect and incorporate the societal preferences on which the equity weights are based (Wailoo, Tsuchiya et al. 2009). Newer efforts propose that the cost-effectiveness plane could more explicitly include equity in its consideration of the performance of health care interventions (Cookson, Mirelman et al. 2017). Another

approach being developed for value assessment and prioritisation of health care interventions is multiple criteria decision analysis (MCDA) (Littlejohns, Weale et al. 2012, Angelis and Kanavos 2016); however, this too remains a developing area.

We have seen that the 'fair innings' approach will be difficult to operationalise. It will also generate a degree of unfairness that is incompatible with the guiding principles of universal health care. The outcome of achieving allocative efficiency from an economist's perspective may not be considered socially favourable in health care, or in other words an unconventional form of a negative externality when equity is compromised. Equity will forever remain a multi-dimensional concept involving subjectivity and value-laden judgements on what constitutes need. More research is required to better understand the health care needs of very old people and how these can most efficiently be met. This may help reduce inequalities in healthy life expectancy that exist in the UK and facilitate a better understanding of what outcomes are important to older groups. We must remember that our ageing population currently poses one of health care's greatest challenges *and* successes. A move to include social values more consciously into clinical practice together with equity more systematically into health economic models would be favourable. This would contribute towards a new approach to prioritisation in this age of longevity increases that are not necessarily accompanied by ill health.

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