Capturing all of the costs in NICE appraisals: the impact of inflammatory rheumatic diseases on productivity

Laura Bojke1, Eldon Spackman1, Sebastian Hinde1 and Philip Helliwell2

Abstract

Inflammatory rheumatic diseases are common. It is estimated that ~2.1% of the population has an inflammatory rheumatic disease (Andrianakos A, Trontzas P, Christoyannis F et al. Prevalence of rheumatic diseases in Greece: a cross-sectional population based epidemiological study. The ESORDIG Study. J Rheumatol 2003;30:1589–601). For diseases such as RA, PsA and AS, onset is most frequent between the ages of 30 and 50 years. The impact of inflammatory rheumatic diseases on physical functioning can be significant. Patients can suffer from swollen joints that cause pain and disability. This can reduce sufferers’ ability to lead fully productive lives. This has major financial consequences for sufferers and their families and there is an economic impact on society. The National Institute for Health and Clinical Excellence (NICE) technology appraisal process has typically ignored any improvements in productivity that may result from treatment. There have been calls to extend the perspective of economic evaluations to include productivity costs as one aspect of wider social effects. However, there are a number of issues that must be resolved before productivity costs can become a routine input into the calculation of cost-effectiveness of treatments. First, there is limited agreement regarding the practical details and appropriate methods for their inclusion in economic evaluation. Second, there are issues that must be addressed regarding society’s preference for equity. This issue arises when considering individual’s economic productivity, that is to say, how we weigh individuals who are more productive (e.g. those in employment) against those who are less so (e.g. the unemployed). Finally, it is important to consider cross-budgetary effects, since productivity has cost and benefit implications outside of health.

Key words: productivity, inflammatory rheumatic diseases, costs.

Introduction

Rheumatological disease and musculoskeletal disorders cover a wide spectrum of conditions. There are >100 types of arthritis, rheumatic diseases and related conditions, but some of the most common include OA, RA, PsA and AS. Rheumatic diseases such as OA are typically associated with old age. In contrast, immune-related (inflammatory) rheumatic diseases, such as RA, occur in younger people, causing pain, immobility and loss of function. RA in particular affects ~1% of the world’s population, with women three times more likely to suffer than men. The prevalence of arthritis in people with psoriasis is ~15% [2].

Many patients suffer from deformed and swollen joints, causing pain and disability and interfering with participation in daily activities [3]. Many patients may also experience depression as a result of their symptoms and the impact these have on their everyday lives [4]. The inability to lead fully productive lives can be a major factor in incentivizing patients to seek medical help for the treatment of these conditions. Most inflammatory rheumatic diseases are treated with drugs, including NSAIDs, steroids, DMARDs and more recently biologics such as etanercept and infliximab. In addition, physiotherapy and occupational therapy are also used in many of these conditions, often alongside drug treatments.

In assessing treatments for use within the National Health Service (NHS), the National Institute for Health...
and Clinical Excellence (NICE) [5] technology appraisal process has typically ignored any improvements in productivity that may result from treatment, such as being able to return to work, in determining cost-effectiveness. In an effort to reflect the ‘true’ societal impact of diseases and their treatments, it has been argued that evaluations should include productivity costs as one aspect of wider social effects [6]. There have been suggestions that work disability associated with rheumatic diseases accounts for a large proportion of its associated costs [7]. A priori, we would expect that the inclusion of this category of costs would be an important factor in determining the cost-effectiveness of treatments for rheumatic diseases.

In this article we summarize the potential impact of inflammatory rheumatic diseases on productivity, discuss the issues associated with measuring productivity and the ethical and policy implications of doing so, and finally consider how including productivity costs might change the way in which the NICE appraisal process works.

Potential impact of disease and treatment on productivity

It has been suggested that compared with other chronic conditions such as diabetes and health disease, arthritis (which includes inflammatory rheumatic diseases) is associated with the greatest activity limitation for a given population [3]. However, it is difficult to quantify the exact number of individuals that are willing but unable to work because of disability resulting from inflammatory rheumatic disease, or the limitations placed on the productivity of those who continue to work with the disease. Despite these difficulties, it is clear that given the significant proportion of the population that suffer with such diseases [8] and the large number of these that are likely to be between the ages of 30 and 50 years, this number would be substantial.

The inability to partake in paid work has major financial consequences for suffers and their families [9], and there is an important economic impact on society [10]. However, despite the significant burden of disease and the anticipated impact of productivity losses, previous attempts to quantify productivity costs in inflammatory rheumatic disease have been rather limited in scope. Work is largely focused on RA, primarily because of its high prevalence [11] and thus its highly anticipated impact. Previous studies have shown that up to 54% of patients with RA experience work disability [11]. Efforts to quantify productivity costs have also been primarily concerned with quantifying days of absence from work [11]. The mean number of days absent from work in the past 12 months has been estimated at 39 days for RA and 11.3 for AS [12].

There have been a few attempts to more accurately quantify work productivity, capturing more than just days absent from work [13]. This includes the use of the Work Limitations Questionnaire (WLQ) [14] and the Work Instability Scale (WIS) [15]. Using the WLQ for patients receiving medications for arthritis (including inflammatory arthritis), the excess productivity loss has been estimated at 2.5%, which equates to US$1250 per employee per year [16]. Such numbers are significant and are likely to imply substantial financial losses for employees.

It is not clear, however, what the impact of treatments for inflammatory rheumatic diseases are on productivity. There is some evidence to suggest that for patients with RA who respond well to biologics, there is a trend towards less future work disability [17]. The effect of previous work disability is, however, difficult to disentangle from this effect. It is clear that there is a complex relationship between treatment and outcomes and that not all patients with a successful outcome will be able to return to productive work. For those sufferers with a long-standing history of disease and those that have received numerous ineffective treatments before responding well, the physical and psychological barriers to restarting work may be too significant [17].

Capturing productivity costs

Productivity costs refer to the value of the time lost from treatment or disease. This value has been measured as quality of life or monetarily. Specifically, the time lost encompasses: (i) time away from work (absenteeism); (ii) impaired ability at work (presenteeism); and (iii) inability to engage in leisure activities [18]. As discussed, this occurs due to increased morbidity and mortality, but also includes the time for treatment, whether travelling to a clinic or receiving care [19]. Caregivers’ time is also spent due to the disease and treatment, thus the consequences of productivity costs are felt by the patient, caregiver, employers and society.

From the perspective of the patient and caregiver, the consequences of lost time may affect their ability to consume either leisure time or products. Product consumption may be reduced if there is an inability to work that leads to lost earnings. An employer will be affected by work loss and inefficiency, while society may experience productivity costs through decreased economic growth and tax revenues and the increased use of social assistance. For all stakeholders it is better for a patient to be able to work. The balance of where the effects of productivity loss fall, between the patient, employer and society, depends on chronic illness insurance and the social safety nets available to the patient. Despite the clear detrimental effects of productivity loss, the use of productivity costs in the economic evaluation of treatments has been controversial. This is largely due to equity concerns and cross-budget effects, meaning that some benefits of treatment fall outside of the health realm and some activities funded outside of the health budget affect health. Additionally, limited agreement exists regarding the practical details and appropriate methods for their inclusion in economic evaluation. In order to quantify productivity for economic evaluation, two distinct processes must be undertaken: first, it is necessary to measure the time lost; second, it is necessary to value that time. The best methods for conducting these activities are still being debated in the literature.
Quantification of productivity losses

Various standardized measures exist to quantify changes in productivity, such as the Quantity and Quality instrument, Work Productivity and Activity Impairment questionnaire, Osterhaus method, WLQ and the Health and Labour Questionnaire (HLQ) [20–24]. The HLQ, for example, is an individual self-completion questionnaire. It is broken into four modules: ability to perform paid work, loss of productivity while at work, productivity outside paid employment and a combined module on paid and unpaid activities [24]. Across the available measures, studies have shown differences in psychometric properties [13, 25] and wide variation in time lost estimates [20, 26, 27]; as a result of these differences it is not possible to define an ideal measure of changes in productivity [28].

Valuation of productivity losses

The literature focuses on three methods for valuing lost work and leisure time due to ill health: the human capital approach, the friction cost approach and the US panel approach. According to the human capital approach, the value of time not working (absenteeism or presenteeism) is equal to the gross wage that represents the value of missed work to the employer and employee and the value of the contribution to society in the form of taxes. Using the human capital approach, the value of missed leisure time is equal to the net wage, since a net wage is what an individual gives up when they choose not to work. This approach may be susceptible to double counting that occurs when benefits, as measured by quality of life, incorporate patients’ expected differences in consumption of leisure or goods. If such benefits are combined with productivity costs, then the differences in consumption have been double counted [19].

The friction cost approach focuses largely on the valuation of time lost from paid work as a result of illness [29]. The existence of involuntary unemployment means that when an individual is unable to attend work due to illness, there is a pool of unemployed people to replace the sick. This implies that the cost to the employer and society of losing an employee is not the full gross wage of the employee, but the cost of identifying and training a new employee. The cost to replace an employee is called the ‘friction cost’ and can be used to value the lost productivity due to illness. There is still the potential risk of double counting. A third approach is that proposed by the US Public Health Service [18]. This approach controversially proposed the valuation of productivity through a generic preference-based measure of health such as the quality-adjusted life year (QALY). The approach has, however, been widely criticized as impractical [19].

Even with the significant amount of literature surrounding this topic, there is no definitive method for valuing productivity losses; instead, it is largely agreed that the approach should be case dependent and informed by reasonable assumptions. Indeed, these three methods are not entirely mutually exclusive [19] and, as such, a combination of methods may be appropriate. Unfortunately, however, the range of choices lead to substantially different results, which means that productivity costs between studies are likely to have low comparability.

Inclusion of productivity losses in the QALY

Many authors have argued that any attempt to quantify the productivity implications of medical treatments is largely unnecessary and that responses to quality of life questionnaires will implicitly take into account changes in income and effects on consumption as a result of morbidity. Measures such as the QALY combine quality of life and length of life, which according to the above argument may take into account the patients’ change in productivity due to morbidity and mortality. This would imply that, when using the QALY, only the productivity effects on wider society need to be captured. This approach was recommended in the Washington Panel’s 1996 recommendation (and subsequent clarifications) [30]. More recently, Tillings [31] investigated whether responses to quality of life questionnaires implicitly consider income effects. They found that 49% of respondents report inclusion of personal income effects; however, there was little difference in health state valuations between this group and the remaining 51% of respondents who did not consider income effects. The authors concluded that the respondents’ inclusion of income losses do not significantly affect health state valuations, and hence the QALY does not represent the effects of lost productivity.

Equity and distributional concerns

If productivity considerations are to be included in the evaluation of medical technologies, it is necessary to consider the equity implications. The inclusion of productivity implications may be inconsistent with egalitarian principles, as programmes that allow the more productive to return to work faster will be deemed more valuable than those aimed at the least productive [19]. Depending on the method used to value productivity, the value of a treatment might depend on the treated populations wage rate or the ability to be replaced at work. This suggests that treatments for those that do not work, such as the elderly or the disabled, or those on low incomes, will be considered less valuable. As a result, there may be a trade-off between the ‘desirable’ implications of including productivity gains in the evaluation and the ‘undesirable’ distributional effects. Ultimately the optimal point will be dependent on society’s attitude to inequality [32].

Cross-budget effects

The decision to include productivity in economic assessments may also be driven by the payer/decision-maker’s perspective. A payer with remit for societal well-being might support the inclusion of productivity as a more complete reflection of the actual societal changes due to treatment [18, 29, 33]. Even a funder with remit for ‘health only’ might support the inclusion of productivity, as changes in productivity affect health budgets and other public budgets that improve health (education, housing and working conditions). However, not all productivity benefits will fall on patients’ health, and the manager of a health budget
must determine whether they are willing to use the health budget for non-health benefits. Theoretically the allocation of budgets could adjust for the use of new treatments that have non-health benefits; however, this may be a double-edged sword, as non-health programmes will also contend for the inclusion of their health benefits, arguing to allocate budgets away from health [34].

**Potential impact of incorporating productivity costs on NICE guidance**

The NICE technology appraisal process [5] assesses the costs and benefits associated with competing treatments used to treat a range of different diseases and conditions. It has previously assessed multiple treatments for inflammatory rheumatic diseases including RA, PsA and AS, producing guidance for their use in the NHS. In assessing treatments for inflammatory rheumatic conditions, NICE currently only includes costs that fall on the NHS; a third-party payer perspective [5]. In addition, it only includes benefits as measured by health-related quality of life (HRQoL) pertaining to the patients receiving treatment. In assessing treatments, often evidence is presented to NICE appraisal committees on indirect societal costs or benefits, including productivity; however, these are not represented in the calculation of costs and QALYs, which are used to calculate the incremental cost-effectiveness ratio (ICER). Instead they can be used to support claims that not all benefits to patients are represented by gains in HRQoL, and as such the threshold may need to be adjusted to reflect this [5]. The problem with this is that it is unclear how committee members incorporate this information, and there are likely to be differences between the various committees since trade-offs and values are not explicit.

There have been many calls to explicitly include information on productivity changes in assessing treatments for rheumatic disease [35]. Treatments for inflammatory rheumatic disease, in particular biologic agents, may potentially reduce the costs associated with work disability by allowing patients to halt the progression of disease and reduce inflammation and pain [7]. Also, given the significance of the proportion of total costs that are likely to be described as productivity costs, it would seem likely that by incorporating these indirect costs into any assessment of cost-effectiveness, many treatments previously categorized as too expensive for a given change in outcome (measured by the QALY) would be recategorized as cost effective (within the £20 000–£30 000 threshold for a QALY gained) [5]. This would include those drugs denied on the basis of their high acquisition and administration costs compared with other (similar) drugs [36]. It may also reduce the differential cost of these treatments compared with a do-nothing or standard care strategy, improving their position relative to the threshold for cost-effectiveness. The inclusion of such costs may also influence the focus of further research in this area. Instead of commissioning research to quantify the impact of treatments using clinical disease measures, research may shift to methods for capturing productivity changes.

The fact remains, however, that the majority of NICE assessments for inflammatory rheumatic diseases have resulted in a positive outcome [36–38]. This is despite the exclusion of productivity costs. This may reflect in part the implicit inclusion of these costs in determining if treatment should be funded by the NHS, through the considerations of the appraisal committees, or perhaps it simply reflects the fact that these treatments improve outcomes to such an extent that even when excluding productivity cost savings, they are regarded as cost effective. Treatments such as biologics also reduce the need for health-care services such as hospital admissions to treat flares of disease and community-based health-care services. These cost savings will be reflected in total costs, which may offset some of the additional acquisition and administration costs associated with these drugs.

The practical implications of extending the perspective for NICE guidance cannot be underestimated. If a wider perspective is used by decision makers, the implications of this on budgets will need to be considered. Incorporating wider societal impacts of treatments on individuals will influence their lives outside of that defined within the concept of HRQoL. It would therefore seem reasonable that these effects should be paid for outside of the health-care budget. Developing systems for and managing cross-sectorial budgets would be a significant undertaking.

There are other practical issues associated with extending the perspective of NICE appraisals. This would add significantly to the burden of data collection for both manufacturers and independent assessment groups (working for NICE). Ensuring that the mechanisms to collect these data routinely within trials are in place is likely to take time and significant resources. Some of this may be justified, at least from a manufacturers’ perspective, if they are able to claim higher prices, for example, through the proposed mechanisms for value-based pricing (VBP). VBP looks likely to include additional considerations in setting the appropriate price for drugs in the UK, one of which is inclusion of wider societal benefits of treatment, such as productivity gains [8]. The details of this have not yet been clarified, however, and it is unclear what measures will be used to capture these gains. However, any inclusion of these wider social effects incorporated into economic evaluation will need to incorporate both the impact of new technologies and that of displaced services. In other words, additional costs falling on the NHS budget can have opportunity costs in terms of wider social effects, so we must also consider the productivity lost from displaced treatments. Practically, the inclusion of productivity costs, all else being equal, will only increase funding to treatments that improve productivity.

**Conclusion**

Ultimately the decision to include productivity costs in the NICE appraisal process should be governed by social preferences over the equity issues raised by implicit
differential weighting of treatments focusing on productive individuals vs those aimed at the less productive. In addition, the likely overflow of benefits outside of the health-care sector needs to be reconciled with the implications of generating these benefits for health budgets. Practically, many questions regarding appropriate measures remain to be answered.

Rheumatology key messages

- Inflammatory rheumatic diseases can have major financial consequences for sufferers and the economy.
- NICE does not routinely incorporate productivity costs when assessing cost-effectiveness.
- There are a number of issues before productivity costs can be incorporated into cost-effectiveness analyses.

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References