Indirect Costs of Lost productivity: Conceptual and methodological considerations within the UK

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Abstract

Indirect costs in relation to lost productivity are associated with significant economic costs. Early research focused on absence from work related costs; recently there has been a greater realisation of the impact of reduced productivity due to illness (known as presenteeism). There is no consensus on appropriate methods with regards to measurement and valuation of production loss in relation to absenteeism and presenteeism. In spite of efforts to reduce sickness absence and growing concerns over presenteeism, empirical work on full lost productivity costs is almost non-existent within the United Kingdom (UK). In this paper two issues are discussed: i) the methodological issues regarding measurement and valuation of lost productivity concepts of absenteeism and presenteeism both generally and specifically in the UK context; and ii) a research agenda working towards increased attention in the application of measures of absenteeism and presenteeism both generally and within the UK. The methodological issues discussed include the lack of consensus over the most appropriate valuation method for absenteeism (human capital method & friction cost method), the variety of approaches available for measuring presenteeism, the lack of clarity around methods available for translating outputs into monetary values and the general lack of empirical evidence to clarify these valuation aspects within economic evaluation. The second part highlights the shortage of research in comprehensive aspects of measurement and valuation of lost productivity and considers means of stimulating increased application of lost productivity estimates. The paper concludes with a research agenda.

Introduction and Background

Traditionally, researchers within the economic evaluation framework have focused on health care costs by adopting narrower perspectives for their studies. There has been less consideration of productivity costs and their inclusion and exclusion within economic evaluation (Brouwer and Koopmanschap, 2005). Nevertheless, there are significant costs associated with lost productivity in health care which are ignored as a result of taking this narrow perspective (Maniandakis and Gray, 2000; Crystal Peters et al., 2000; Stewart et al., 2003). The importance of assessing indirect costs of lost productivity cannot be underestimated if current evidence is to be considered. For example, in a 2006 absence and work health place survey, the indirect costs of lost productivity were estimated at £13.4 billion as a result of 175 million days lost by workers in the United Kingdom, (CBI/AXA, 2006). In a previous report on the UK working population by Dame Carol Black, the economic costs of sickness absence and worklessness as a result of ill health were estimated to be around £100 billion a year (Black, C, 2008). More recent reports show illness or injury was responsible for 29.3 million days taken off sick in Great Britain during 2008/09 with an estimated 9.3 million work days lost through work-related disorders alone (HSE, 2008/2009).

However, the inclusion of productivity costs remains controversial. In recent years there has been debate about whether productivity costs should be included by considering a societal perspective (Gold et al., 1996; NICE, 2008; Brouwer et al., 2005; Brouwer et al., 1997) and if so how they should be included within economic evaluation and particularly cost-effectiveness analysis (Pritchard and Sculpher, 2000). There still seems to be little consensus about the inclusion and exclusion of these costs. Nevertheless, there has been renewed interest in the inclusion of productivity costs in economic analyses. In a recent review, 22 of 30 national pharmacoeconomic guidelines reviewed were in favour of incorporating productivity costs within economic evaluations (Knies et al., 2010), although few studies incorporate these costs. In the UK, NICE guidelines do not provide for the inclusion of productivity costs within the reference case which focuses on National Health Service (NHS) and Personal Social Service (PSS) costs (NICE, 2008). There is also controversy on how these costs should be measured and valued (Brouwer and Koopmanschap, 2005).This is particularly apparent in the recently introduced concept of reduced productivity due to illness amongst those still working known as presenteeism (Backer-McClearn et al., 2010; Johns, 2010; Caverley et al., 2007; Hemp, 2004, Heuvel et al., 2010).

This paper provides a basis for discussion of the current methodological issues in measurement and valuation of both absenteeism and presenteeism, and aims to identify approaches relevant for economic evaluation studies. The first section introduces the concept of productivity costs and background information on absenteeism and presenteeism. The second section reviews and discusses the methodological issues with regard to measurement and valuation of productivity costs both generally, and specifically in the UK context. The discussion of productivity costs is limited to paid employment. The concluding section discusses outstanding issues and proposes a research agenda for improving productivity cost measurement and valuation within economic evaluation.

What are productivity costs?

While health care costs were the focus of most early research, recently more researchers have become concerned with indirect costs of health in relation to lost productivity, commonly known as productivity costs. In this paper, the terms productivity costs and indirect costs will be used interchangeably in reference to lost productivity costs associated with absenteeism and presenteeism within paid employment.

Productivity costs are defined as….'*Costs associated with production loss and replacement costs due to illness, disability and death of productive persons, both paid and unpaid*' (Brouwer et al .,1997, p254). Elsewhere, the United States Washington panel defined productivity costs as… '*costs associated with lost or impaired ability to work or engage in leisure activities due to morbidity and lost economic productivity due to death'* (Gold et al., 1996 ,p181)'.

Generally in relation to paid work, productivity costs relate to benefits foregone to society as a result of individuals not being able to work or working with limitations due to illness resulting in productivity loss. Indirect costs in relation to lost productivity arise mainly as a result of sickness absence or sickness presence (Heuvel et al., 2010). Although many country guidelines recommend inclusion of productivity costs (Knies et al., 2010), there are still methodological issues that limit application of these costs within economic evaluation. Previous methodological concerns have revolved around a lack of consensus about the valuation of productivity costs in relation to absenteeism (Johanesson and Karlson et al., 1997; Koopmanschap et al., 1997; Brouwer and Koopmanschap, 1997). However, with the increased focus on presenteeism more generally, the research agenda within economic analysis is being expanded to include methodological issues relating to presenteeism (Johns, 2010; Demerouti et al., 2009). Whilst much has been written about the presenteeism concept

(Hemp, 2004; Schultz et al., 2009; Widera et al., 2010; Baker-McClearn D.,2010; Gustafsson and Maklund.,2011), there is still significant uncertainty about both quantification and monetization methods, and as a result there appear to be no efforts to take the concept forward empirically particularly within the economic evaluation framework. This is clearly reflected in the dearth of studies in economic evaluation attempting to include presenteeism as an element of reported productivity costs.

What is Absenteeism?

The concept of absenteeism can be referred to as reduced productivity as a result of workers not being able to report to work due to health problems (Heuvel et al, 2010, Escorpizo et al., 2007). The absence could be as a result of short-term illnesses, long term disability or death (Schultz et al., 2009). Absenteeism includes various time components including sick days off work and time away from work related to short and/or long-term work disability. Traditionally researchers have concentrated on measuring indirect costs in relation to absence from work as a result of sickness (Beaton et al., 2005).

How is absenteeism measured?

Absenteeism is measured by determining how much time individuals have missed from work due to sickness (Mattke et al., 2007). However, access to sickness absence records can be quite challenging and many researchers have alternatively relied on generating self-reported estimates of sickness absence (Ferrie et al., 2005). The two most common methods for measuring this sickness absence are use of administrative records and self-reported measurement instruments.

Self-reported questionnaires or administrative records?

Measurement of work loss time is generally a complex issue with potential practical and administration challenges (Pole et al., 2006; Evanof et al., 2002). Currently, preference in estimating productivity loss appears to be the use of self-reported measures over administrative records. Administrative records do, however, have the advantage of continuous follow up, easy collection by employers with relatively less expensive means, and the potential to provide large samples of ill workers without potential for recall errors or perceptions biases (Wasiak et al., 2003; Pole et al., 2006). Nevertheless, administrative datasets have several shortcomings, such as incomplete capture of time off work, loss of follow-up of workers due to job losses or changes in work roles and failure in some cases to capture long-term absence from work data (Young et al., 2002).

Whilst self-reported measures are associated with methodological challenges, for practical purposes economic evaluation is better suited to use of self reported questionnaires, particularly in clinical trials and cohort studies as the ability to easily access and use administrative records during trials can be very problematic (Evans et al.,2004)

Due to the difficulty in accessing administrative records, and questions on the reliability of these records, researchers have mainly relied on self-reported measures (Kessler et al., 2004), particularly within economic evaluation. These self-reported measures are usually in the form of self-reported questionnaires, interviews or diary recording methods. The diary and interview methods are generally time consuming and expensive to administer compared to the use of retrospective questionnaires (Van den Brink, et al 2005; Poppel et al., 2002). Diary and interview methods may however provide more valid estimates since they can reduce recall bias whereas questionnaires may be prone to recall errors as they rely on the respondent's memory and perception (Van der Brink et al., 2005; Merideth et al., 2009).

Given the importance of sickness absence as a measure of productivity loss, more attention needs to be paid to the accuracy of these self-reported sickness data. Clearly, further research is needed to determine the extent to which this data varies using different self-report methods; particularly where productivity loss is being estimated over longer periods. Further, research studies linking administrative data and sickness certification data to assess the validity of self-report methods would be valuable in better understanding these methodological issues. Economic evaluation studies conducted within occupational settings could provide an opportunity to assess agreement between self-reported sickness absence data and sick leave company data or certification data.

How is absenteeism valued?

There are three main approaches to valuation and incorporation of lost productivity within economic evaluation: the human capital approach, the friction cost approach and the US panel approach (Sculpher, 2001; Pritchard and Sculpher, 2000). In general, productivity costs are valued in monetary terms and incorporated in the numerator of the cost-effectiveness (C/E) ratio using either the human capital approach or the friction cost approach, compared to the alternative of their inclusion in the denominator side using the US panel approach (Weinstein et al., 1997). This section briefly discusses these methods in order to uncover their limitations and identify potential areas for further research.

The Human Capital Approach

The traditional and most commonly used method for generating monetary estimates of productivity costs is the human capital approach. This method, based on neoclassical labour theory, uses the gross wage as the unit of value for assessing changes in working time due to illness (Brouwer et al., 2002; Johansson, 1995). Thus, productivity costs are quantified in terms of forgone earnings during times of absence from work (Johannesson and Karlsson, 1997). The application of the method involves the measurement of time lost from work and multiplying this by the average estimated earnings represented by gross wages of the individual involved or alternative labour cost measure used (Mattke et al., 2007; Liljas, 1998). In situations of long-term disability or death, lost productivity is represented by the forgone earnings over the entire working life until the retirement age (Van Asselt et al., 2007).

However, although founded in economic theory, the method has been criticised for estimating potential lost production as opposed to actual lost production, which could significantly overestimate the actual production lost (Koopmanschap et al., 1995; Koopmanschap et al., 1992; Koopmanschap and Rutten, 1996). Furthermore, a variety of measures have been used to assess the value of forgone earnings. While most researchers have used a single industry wage rate, others have used a minimum wage or a wage rate for a specific group (Berger et al., 2001; Jacobs and Fassbender, 1998). This is a potential area of further research towards the standardisation of measures used in assessing forgone earnings due to lost labour within economic evaluation.

Further, although widely used within economic evaluation, it is argued the method may not produce accurate economic loss estimates as it fails to take into account the existence of a large pool of the involuntary unemployed within the economy (Sculpher, 2001). The economic theory assumptions fail to consider the reality of the presence of involuntary unemployment which means a sick individual who can no longer work will eventually be replaced by a previously unemployed individual (Tilling et al., 2010). Unfinished work could be completed by a sick employee on return in short term illness episodes, while in the case of long term disability or death an individual from the unemployed ranks can replace the absent employee thus preventing loss to the society (Berger et al.,2001; Pritchard and Sculpher, 2000). These issues led researchers to development of alternative methods. Nevertheless, the human capital method continues to be the predominant method used in the valuation of absenteeism costs even in economies associated with significant unemployment levels.

The Friction Cost Approach

More recently, an alternative method known as the friction cost approach has been introduced (Koopmanschap et al., 1995). With the friction cost approach, the existence of involuntary unemployment limits production losses due to disability, long term disability and death to the period required to replace the disabled or deceased employee from among the unemployed (Pritchard and Sculpher, 2000). In the case of short-term illness, the method assumes various scenarios that could lead to either no short term losses with possible medium term effects or a possible estimate of the lost production during the short term period of absence (Koopmanschap et al., 1995). It assumes individuals absent from work in the short term are able to make up for lost production on return to work or that presence of internal labour reserves can prevent short term production loss (Liljas et al., 1998; Pritchard and Sculpher, 2000; Brouwer et al., 2002). Therefore, production loss is limited to what is termed as the friction period (Koopmanschap et al., 1992).

The main focus is then on what is known as friction costs which encompass lost production during the short-term period, costs of hiring and training new individuals and medium term economic consequences during the friction period (Liljas et al., 1998). This friction period is also referred to as the time needed to restore production levels to their original state (Koopmanschap et al., 1995; Van de Hout et al., 2007). This period depends on the time it takes to replace and train a replacement employee either from the unemployed or employed ranks within the labour market and could vary between certain job types (Koomanschap et al., 1997). Therefore compared to the human capital approach, the method attempts to generate realistic estimates of lost productivity by focusing on actual production loss.

Nevertheless, in the application of this approach, systematic data collection of key parameters is needed. In order to generate friction cost method productivity cost estimates, the following parameters are required: frequency of friction periods, length of friction period, and the valuation of lost production as well as macroeconomic consequences (Koopmanschap et al., 1995). Furthermore, although credited for potentially generating actual production loss estimates, the method has been criticised for having no foundation in economic theory (Liljas, 1998). However recently, Brouwer et al., (2005) proposed a simple theoretical idea underlying the friction cost approach. Overall, the friction cost method has not been widely used, and within the United Kingdom, the method has mainly been applied in cost-of-illness studies using economic parameters from previous work in the Netherlands (Maniadakis and Gray, 2000; Lui et al 2002; Luengo Fernandez et al., 2006; Rivero-Arias et al., 2010; Saka et al., 2009). Few economic evaluation studies have applied the friction cost method in

estimating indirect costs. To our knowledge, one study (Sach and Whynes, 2003), compared estimates from the human capital method and the friction cost method to assess the impact of different methods on the outcome of a cost-effectiveness study and found that variability in methods significantly affected results of the cost-effectiveness study. This is an area that requires further empirical research to better compare estimates from the friction cost approach and the human capital approach both in the short term and in the long run, and in terms of the overall impact on cost-effectiveness results and decision making. Future research, should particularly aim to generate country specific variables needed for application of the friction cost approach. As stated earlier it will be necessary to estimate the frequency of friction periods, length of the friction period and lost production during the friction period within the United Kingdom. Such investigations could also explore the presence of compensation mechanisms such as internal labour reserves for key job types and industries on friction cost estimates. Overall, researchers could aim to provide more empirical evidence aimed at assessing the impact of using the different methods on decision making.

The US Panel method

The US Panel approach was proposed by the US Panel for Cost-Effectiveness Analysis of Health and Medicine guidelines (Siegel et al., 1996). In this method, not all productivity loss is valued in monetary terms as is the case with the friction cost approach and the human capital approach, but rather some components are valued through the QALY measure (Weinstein et al., 1997; Brouwer et al., 2002; Sculpher, 2001). The main proposal of the authors is that productivity costs should be included in the denominator of the C/E ratio. The panel argues that incorporating productivity costs in the cost component would lead to double counting since respondents could consider the effects of health on their incomes during health state valuations of quality of life (Liljas, 1998; Pritchard and Sculpher, 2000; Brouwer et al., 2002). However, this approach generated much controversy and has received considerable criticism. Some have argued that the presence of social security systems and private compensation schemes could lead to misinterpretation of productivity costs from a societal point of view in considering the QALY approach (Brouwer et al., 1997). Furthermore, in valuing health states, respondents could find it difficult to determine how health states are linked to productivity and income. Existing studies investigating whether and how respondents consider income effects when valuing health states have been largely inconclusive (Tilling et al., 2010). Therefore although the US panel method could potentially prevent double counting of productivity losses, various questions still remain about its impracticality (Sculpher, 2001). A review by Pritchard and Sculpher (2000) of productivity

costs in practise shows the method has mainly been used within the United States. However, there has been no application of the US Panel approach with the United Kingdom. This debate of whether to incorporate indirect costs within the QALY component therefore remains a necessary area of further research. Further empirical research on whether individuals consider effects of health states on productivity, and consequently income when valuing health states in the commonly used quality of life measures including the ones that explicitly instruct respondents to consider income effects could provide greater understanding on how the issue of double counting can be addressed in cost-effectiveness analysis.

What is Presenteeism?

Presenteeism is a recently developed concept that refers to reduced productivity or performance while at work due to ill health (Cooper and Dewe, 2008; Schultz and Erdington, 2007). With presenteeism, the worker is physically present at work but functioning at less than full productivity because of sickness (Turpin et al., 2004; Beaton, 2005; Johns, 2010). Interest in the concept of presenteeism has been fuelled by reports that presenteeism is associated with significant costs, in many cases even more than absenteeism costs. Studies have shown presenteeism accounts for as much as 89% (Goetzel et al., 2004) in migraine, 84 %(Stewart et al., 2003) in Arthritis, 77 %(Stewart et al., 2003) in back pain and 67 % (Ricci et al., 2005) in overweight and obese employees of overall productivity costs. A recent study by the Sainsbury Centre for Mental Health estimates that presenteeism accounts for 1.5 times more working time lost than absenteeism with the costs to UK employers of mental health problems alone estimated at £15.1 billion per year. (Sainsbury Centre for Mental Health, 2007).

Measuring presenteeism in practise

One of the major shortcomings of administrative datasets is the inability to incorporate and capture presenteeism measures associated with reduced productivity while at work leading to underestimation of productivity costs (Evanoff et al, 2002). The recent interest in the measurement of the presenteeism concept has therefore led researchers to develop various self-reported measurement instruments that can be used to measure absenteeism and presenteeism productivity loss values. Recent reviews of presenteeism instruments have described various aspects of presenteeism measures with variation in content and psychometric properties and no consensus over the most appropriate measurement instrument (Lofland et al., 2004; Prasad et al., 2004, Mattke et al., 2007). In this paper, twenty productivity measurement instruments were identified that assess the impact of absenteeism and presenteeism on respondents' health. The instruments are either generic or specific to

certain health conditions, vary in length, category of productivity related questions, with recall periods ranging from 1 week to 1 month and have different approaches used in eliciting the productivity estimates (Ozminkowski et al., 2004).

These measures elicit self-reported values on the health and the impact of health on productivity of the respondents (Johns, 2010). There are different approaches to eliciting presenteeism themes that could be summarised into three themes:

i) assessing perceived impairment due to presenteeism

ii) estimation of unproductive time during working hours or the time needed to make up for lost time while working due to illness

iii) comparison of worker performance with other similar work roles.

Perceived Impairment

This method assesses the perceived productivity loss by asking respondents to provide an estimate of the effects of health on their work performance. This can be obtained in two different ways. The first asks respondents to provide an estimate of their overall work performance on a global rating to determine how illness has hindered or affected their performance at work (Kessler et al., 2003). This approach is used in the widely used Work Productivity and Activity Impairment questionnaire which includes the following item (based on an 11 point 0-10 numerical rating scale):

> *"During the past 7 days, how much did health problems affect your productivity while you were working?"(Reilly et al., 1993; Reilly et al., 2008).*

The second approach assesses the impact of illness on various work aspects by assessing different domains of work functions in order to estimate an overall percentage value of productivity loss (Kessler et al, 2003; Johns, 2010). For example, the Work Limitations Questionnaire (WLQ) uses four domain scales (time management, physical, mental interpersonal, and output) that enable respondents to assess their difficulty or ability to perform specific tasks due to presenteeism based on a visual analogue scale of 0-100% (Wahlqvist et al., 2007). Other instruments in this category include the Stanford Presenteeism Scale (Collins et al., 2005), Endecott Work Productivity Scale (Endicott et al., 1997) and the Work Health Inventory (Ricci et al, 2005), and these focus on estimating the effect of presenteeism by considering different aspects of performance in the work domain. Additional instruments that use the perceived impairment concept include the Work Productivity inventory (Goetzel et al., 2004), Health Related Productivity Questionnaire Diary (Kumar et al., 2003), Migraine Disability Assessment Questionnaire, and Migraine Work and Productivity Loss Questionnaire, Angina related Limitation at Work Questionnaire and the Quantity and Quality method (Meerding et al., 2005).

The instruments that consider different aspects of the work domain within this approach encompass demands of different job types and occupations (Kessler et al., 2003) and can therefore be used to assess productivity loss in diverse job types as compared to the instruments that estimate a global measure of productivity loss.

Comparative Productivity Assessment

The second theme uses comparative productivity assessment methods to adjust an employee's performance by how they relate their own productivity performance in relation to other employees or in relation to their usual performance (Hilton et al., 2008). This approach, although not common in literature, is evident in the Health and Productivity questionnaire (HPQ) (Kessler et al., 2003; Hilton et al., 2008) and the Health and Work Questionnaire questionnaires (Halpern et al, 2001). For example, in the HPQ, a respondent is initially asked to rate the average performance of a worker in a job similar to theirs and then asked to rate their usual job performance of the past year, using a 0-10 scale. The advantage with this approach is that the estimates generated can easily be incorporated into presenteeism monetary calculations. In addition, the approach has the advantage of having standards against which impairment estimates obtained from respondents can be compared in this case either using other employees or the respondent's usual performance.

Estimation of unproductive and time lost

The third theme is manifested in two approaches that include directly eliciting what is considered as unproductive time at work and estimating the time lost by an employee while working due to illness. An example of the first approach is seen in an internet survey using the Work Productivity Short Inventory instrument where respondents are asked to estimate the unproductive hours due to asthma related illness during a typical 8-hour workday (Oziminkowski et al., 2004). The hours are then used as the time lost due to presenteeism during that period as done when estimating absence related time. The second method as used in the Health and Labour Questionnaire, asks the respondent to estimate the extra hours they would have to work in order to catch up on tasks they are unable to complete in normal working hours as a result of health problems (Zhang et al., 2008). This approach has the advantage of generating productivity loss values relatively easily in similar fashion to the absence related productivity loss measures, and the estimates generated are in a format that is easily transferable into monetary estimates.

Is there a preferred presenteeism measurement approach for economic evaluation?

Assessing the difference between the different approaches could provide a way forward towards identifying the most appropriate measurement approach, and consequently measurement instrument for assessing presenteeism within economic evaluation.

In terms of practical application, the assessment of perceived impairment has been frequently used mainly on the grounds of the ease in obtaining estimates from respondents compared to the approach of requesting comparative estimates with other employees or previous performances. The challenge with asking for the perceived impairment however is that the estimates generated cannot be compared against any standard as in the case of comparative measures of self-reported performance in which an individual's reported performance is compared with a benchmark.

A further issue is that, the results from instruments that estimate perceived impairment across different work domains are not as easy to incorporate into monetization computational calculations as the results from comparative presenteeism measures. However, the approach of estimating unproductive time while at work obtained in a similar way as estimating absence time from work provides the easiest means of translating presenteeism results into monetary estimates. Nevertheless, there have been no attempts to validate whether individuals can accurately estimate unproductive time as has been carried out in the case for absenteeism. Considering the diversity of approaches and instruments, few studies (Oziminkowski et al., 2004; Collins et al., 2005) have attempted to directly compare measurement instruments assessing the impact of health on reduced productivity to the same sample of respondents. Additional research is sought in this area.

How is presenteeism translated into monetary terms?

There has been little research investigating approaches to converting measured presenteeism into monetary values of productivity loss.

Quantification of productivity loss from output values

Apart from productivity loss values obtained from instruments that directly measure presenteeism, as seen in the Health and Labour Questionnaire, a majority of the measurement instruments generate output values that need to be converted into productivity loss values. Of the instruments reviewed, only the Work Productivity Activity Questionnaire Health, Migraine and Work Productivity Limitations Questionnaire, Worker Productivity Short Inventory, Osterhaus Technique, Health and Productivity Questionnaire and Health and Labour Questionnaire are able to generate outputs that can be directly converted into

productivity loss values. Other instruments including commonly used instruments such as the Work Limitations Questionnaire and Stanford Presenteeism Scale generate outputs in form of a score that cannot be directly transformed into productivity loss values. Nevertheless, with some assumptions the output values generated from these measures can be converted into productivity loss values (Lofland et al., 2004; Brooks et al., 2010). In quantification of presenteeism, methodological issues remain in assessing the best approach to use in quantifying presenteeism as some measures generate a direct productivity loss value while others indirectly estimate productivity loss values.

The methods used in valuing lost productivity in relation to absenteeism have largely been considered for monetary valuation of the presenteeism concept. Recently, the human capital method has been used to monetize presenteeism using productivity loss values from self-reported questionnaires and wage rates to obtain productivity costs related to presenteeism (Zhang et al., 2008; Hilton et al., 2008; Kessler et al., 2003; Hellgren et al., 2009). As in the case of absenteeism, the attraction of the human capital approach is in the ease of computing presenteeism cost estimates using a combination of productivity loss estimate and wage rates. Nevertheless, there are also similar methodological issues since the method estimates potential lost productivity by valuing all changes in worker productivity during periods of reduced productivity (Evans et al., 2004). The method ignores various possibilities that include among others a team member being assigned to assist a worker operating with presenteeism, job interdependencies in some situations, the hiring of additional workers to help the sick employee while at work and compensation mechanisms that could include workers making up for lost time. In such cases, the human capital approach might capture economic loss where it might be non-existent. Other methods including the friction cost approach, introspective (Brooks et al., 2010), firm-level (Mattke et al., 2007) and team production methods (Pauly et al., 2008) have not translated into practical application within presenteeism. This clearly is an area that warrants further research.

A review of recent articles published within the literature shows majority of studies involving estimation of presenteeism costs have been carried out within the US (Snedecor et al., 2008; Ricci et al, 2005; Lerner et al., 2008; Henke et al., 2000; Goetzel et al., 2010; Collins, 2005; Burton et al., 2005; Stewart et al., 2003a; Wilson et al., 2010; Cisternas et al 2003; Goetzel et al., 2004; Burton et al., 2002). Other countries from which studies have been carried out include Sweden (Hellgren et al., 2009); Netherlands (Boonen et al., 2010), Canada (Zhang et al., 2008), and Denmark (Kornberg et al., 2007). There are no published studies that have attempted to incorporate and assess the effects of presenteeism costs within an economic

evaluation framework in the United Kingdom. Therefore as research on measurement and valuation of presenteeism advances, future studies could seek to include presenteeism estimates within economic evaluation in order to investigate the effects of the inclusion of full productivity costs and their overall effects on decision making.

Unresolved Issues and Research Agenda

There are still methodological and empirical opportunities for further research that could be explored and addressed both within measurement and monetary estimation of absenteeism and presenteeism within economic evaluation.

Measurement of productivity costs

The case for Absenteeism

Sickness absence data is dominated by self-reported measures as opposed to administrative records. Administrative data from employers is considered a potential reliable source for productivity loss values although the practicability aspects of using employer data in trials remains challenging as a result self-reported are commonly used. Given the significance of absenteeism costs, research that could facilitate resolution of the accuracy, validity and reliability controversies of these methods is still limited. For example, additional empirical evidence within economic evaluation is needed to determine the extent to which absence data from different self-report methods varies. In addition, economic studies linking administrative data and sickness certification data, in assessing the accuracy and validity of self-report data would be useful in answering key methodological questions. This is an area in which work place economic evaluation studies would provide an opportunity for validating self-reported sickness absence data alongside different sources of administrative data.

The case for Presenteeism

Although many presenteeism instruments currently exist, there are various issues that remain unanswered. Most of the measurement instruments currently rely on self-reported data which inevitably are subject to possible recall errors. However, few studies (Goetzel et al., 2003) have attempted to measure the effect of recall periods on productivity loss values generated. Clearly, this is an area warranting further research that will focus on appropriate recall periods and consequent extrapolation methods in the various measurement instruments.

Very few studies (Oziminkowski et al., 2004; Collins et al., 2005) have attempted to compare measurement instruments within the same population, although different instruments have different approaches of eliciting presenteeism estimates. Considering the diversity of current measurement questionnaires little is known about the most appropriate method of measuring

presenteeism as studies comparing productivity loss values from the different instruments are scarce. Research may facilitate resolution of some controversies including the most appropriate instrument and approach for certain job types, settings, and disease conditions in order to establish appropriate best practises in presenteeism measurement.

Valuation of productivity costs

The case for Absenteeism

There is still no consensus on the preferred method for valuing productivity changes, although the application of the human capital method is more prevalent both generally and specifically within the United Kingdom. However, some (Berger et al., 2001) have argued that the friction cost method would be more appropriate in European countries where the level of both hidden and registered unemployment is sometimes substantial. Few studies (Maniadakis and Gray, 2000; Lui et al 2002; Luengo Fernandez et al., 2006; Rivero-Arias et al., 2010; Saka et al., 2009) have applied the friction cost approach and only one study(Sach and Whynes, 2003) within economic evaluation to our knowledge has applied the method within the United Kingdom. Applications of the friction cost approach have routinely relied on economic parameters not specific to other country settings. Therefore, research is needed to obtain country specific estimates of the parameters used including the length of friction period, frequency of frequency period and possible variations of these parameters in key specific subgroups for the United Kingdom. With the availability of these parameters, studies could better compare estimates from the friction cost approach and the human capital approach both in the short term and in the long run and their overall impact on decision making.

In assessing the value of forgone earnings due to sickness, researchers have used wage rates for industry/occupational groups; others have used minimum wage values, still others have used average values. Research comparing these different measures within economic evaluation may facilitate consensus on the appropriate measures towards establishing standard practises and standardisation methods in studies to enable comparisons between studies.

There has been no application of the US Panel approach with the United Kingdom. However, one of the concerns in the application of US panel method is that individuals consider effects of lost income in health state valuation. As most of the research investigating this issue has largely been inconclusive, further empirical research could be undertaken to assess whether individuals consider effects of health states on income in the commonly used quality of life measures including those that explicitly instruct respondents to consider income effects.

Finally, further research could be undertaken to assess the overall impact of illness on productivity in the short-term and how compensation mechanisms that exist within firms to prevent productivity loss can be captured in measurement and valuation of lost productivity.

The case for Presenteeism

There is a general lack of research investigating quantification and valuations methods within presenteeism. In spite of the increasing number of presenteeism measurement instruments, there is no consensus on the best approach to use in transforming these estimates into productivity loss values. Therefore, additional empirical research could help in improving the methods and estimates generated by comparing the different methods to determine the extent to which the estimates generated from the different methods differ. Furthermore, there is a need for increased transparency in the calculations and methods used. In addition, monetary estimates for presenteeism have mainly been generated using the human capital method although the method might fail to capture compensation mechanisms within workplaces such as the existence of job interdependencies and making up for lost work time. There have been no attempts to apply of alternative methods in generating presenteeism monetary estimates. Future research could explore other methods of valuing presenteeism and how the estimates generated compare to the human capital method estimates. Finally, presenteeism costs have often been excluded in economic evaluation studies although these costs have been shown to be significant (Goetzel et al., 2004; Stewart et al., 2005; Ricci et al., 2005). Therefore, regardless of applications of the human capital method or alternative methods, empirical research that generates and incorporates estimates of presenteeism within economic evaluation is needed.

Conclusions

It is critical to have reliable measurement and valuation approaches for absenteeism and presenteeism if the application of these estimates within economic evaluation is to be realised. Given a lack of consensus of a preferred approach for valuation of absenteeism and the recent developments in measurement and valuation of presenteeism, this paper has attempted to highlight the methodological issues in relation to incorporation of lost productivity in economic evaluations towards an increased research agenda in this area. Overall, future research is necessary towards increased transparency in how presenteeism is measured, monetized and incorporated into economic evaluation. Furthermore, although the human capital method is frequently used, this frequency does not automatically indicate advantage over other measurement approaches. Alongside future work on improving the application of human capital method, assessments of the practicability of adopting alternative

methods such as the friction cost method are warranted both generally and within the United Kingdom. Research is also suggested in various areas in order to move towards resolution of controversies and increased incorporation of productivity costs of absenteeism and presenteeism in economic evaluation studies both generally and within the United Kingdom.

Although, questions of whether or not to include productivity costs in economic evaluation remain hugely important and somewhat controversial, we would prefer it if the discussion of this paper could work on the assumption that it is desirable to measure productivity costs and focus on the methodological concerns and how these can be addressed. We would very much welcome the views of HESG participants on these issues in particular:

- Are there any other relevant productivity loss measures that could have been missed? Any other relevant literature?
- Thoughts on the application of the friction cost method
- Are there other relative benefits of adopting the friction cost method for measuring productivity loss?
- Any views on the measurement of presenteeism and its inclusion within economic evaluation. Most appropriate measurement instruments?
- Any comments on validation of the self-reported measures using administrative datasets or sickness certification data sets
- Any comments on the measurement of short-term productivity costs in the presence of compensation mechanisms
- Comments on methodological issues highlighted and any other issues we might have missed

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