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Developing a worldwide method for cost benefit analysis for safe patient handling interventions, to be completed by safe patient handling practitioners. A pilot study.

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The International Panel of Patient Handling Ergonomics (IPPHE) is a collaborative, academic and practitioner group that have been developing best practice and research projects since 2003. The publication of the ISO Technical Report TR12296 indicated that a clearer understanding of the methods for costing safe patient handling (SPH) programmes was required. This paper is the first exploratory investigation towards developing a worldwide approach to reporting and utilising a cost benefit analysis method for SPH programmes. An electronic survey was developed to gain the background and baseline knowledge of a range of individuals from the IPPHE group and their organisations. An explorative qualitative methodology was adopted to develop the broad items that would need to be reported in the costings methods moving forward. 47 surveys were completed from 9 countries from 74 individuals. The survey responses were analysed for content and themes. The analysis described a template to be taken forward to support the development of a usable cost benefit process for all.

Practitioner Summary: There is a growing body of evidence supporting the efficacy of SPH programmes, the cost benefits however are less well reported. The IPPHE has embarked on a project to develop a worldwide method to record and report the costs and benefits of SPH programmes. The method for data collection and reporting will be used by patient handling practitioners to show their organisations the benefits of their programmes and support future support and investment.

Keywords: Patient handling, cost benefit analysis, qualitative, healthcare ergonomics

1. Introduction

Cost benefit analysis is a familiar process to evaluate the impact of a wide range of ergonomics interventions and is more familiar for the assessment of the benefits of healthcare interventions. The lack of a standardised process for assessing the benefits of safe patient handling (SPH) programmes has in part contributed to the lack of research in the financial evaluation of this field. Fray and Hignett (2013) proposed a standard method for the evaluation of SPH interventions but the financial contributions in the process has yet to be validated. High level and detailed evaluations have been reported by Thomas, Celona and Matz (2010) based on the methods defined in McNamee and Celona (2008) but the complexity and cost of the method place this process out of reach of many organisations.

The International Panel of Patient Handling Ergonomics (IPPHE) is a collaborative academic and professional group whose aim is to improve the evidence base for the improvement of SPH programmes and research. IPPHE identified a working party to explore the understanding of the financial evaluation of SPH interventions. The overall aim of this project is to define a standard method for delivering a financial evaluation for all types of SPH interventions and programmes in all care settings. This paper describes the first stage of this collaborative project which aims to record the different aspects, conditions and items that should be included in the financial evaluation.

1.1 Literature Review

Though the process of cost benefit analysis and other supporting methods have been the subject of much publication the methods for costing SPH programmes have not had similar. High level and detailed evaluations have been reported by Thomas, Celona and Matz (2010) and subsequent organisational data

sets are awaiting publication. The detail of retrospectively collecting costs and benefits of a SPH programme has proved demanding in terms of time and finance.

Some studies have included more simplistic reviews of costs relating to SPH programmes. Siddharthan et al (2005) suggested some key values that might be appropriate for the cost comparison. Smedley et al (2005) developed a tool to compare financial commitment by an organisation. The most widely used financial value for inclusion in published studies was the cost of lost time injuries: Evanoff et al (1999), Head and Levick (1996), Hefti et al (2003), Morgan and Chow (2007), Millar et al (2006), Charney et al (2006), Passfield et al (2003), Chhokar et al (2005), Engst et al (2005), Sigvardsson and Bogue (2004), O'Reilly et al (2001), Joseph and Fritz (2006) and Guthrie et al (2004). Several studies also collected information related to injury claims either directly from government or insurance systems or from the organisation concerned: Charney (1997), Nyran (1991), Collins et al (2004), Best (2001), Victoria Government (2004). More general studies used a financial evaluation to compare either the effectiveness of interventions or justify the costs of SPH programmes against the benefits of the outcomes: Santoro (1994), Fazel (1998), Quintana and Alonso (1997), Charney et al (1991 and 1993), Nelson et al (2006), Robotham (2003) and Speigal et al (2004). More recently a paper by Restrepo et al (2013) supported by a Bureau of Workers Compensation has delivered a comprehensive evaluation of the compensation costs across long term care rather than the acute care setting.

Only the time and cost demanding versions of these financial evaluations (Thomas Celona and Matz 2010) considered the prospective gains from effective implementation of SPH programmes. Evidence is growing to support the relationships with the clinical improvements for: reduction of pressure ulcer damage and complications, improvements in the mobility of patients, improvements in the patient experience etc. For a financial case to be reported to support the implementation of comprehensive SPH programmes these will need to be included or considered as possible impacts. This study investigated the range of items that should be included as the objective of a survey and aimed to answer the following research question. What are the key items that should be included when identifying both the financial costs and benefits of the implementation of safe patient handling programmes?

2. Method

This study is an ongoing iterative collaborative project facilitated through the group members of the International Panel of Patient Handling Ergonomics (IPPHE). The overall aim of the project is to develop a cost benefit analysis method that can be completed by all patient handling practitioners (PHP) in all participating countries. A subgroup of the IPPHE network (MF, KH, MM, JC, HK) was responsible for creating the project and will take these results forward for development. The requirements for how to initiate the survey and its structure was developed at a group meeting of the IPPHE subgroup. Further focus group discussions were completed (US, n=15 and UK, n=12) to identify the broad outline topics for this survey. The discussion groups identified the key components of the costs for delivery of an intervention and the requirement to identify all benefits of SPH programmes that could be quantified with a financial cost. It was a concern from the participants in these early considerations that the working knowledge of the PHP may not match the expectations of experts in the field or match the high knowledge of the people developing the cost-benefit analysis tools. To evaluate the understanding of the PHP the survey was created to be inclusive and exploratory. The open general questions allowed the participants to add their own thoughts and expectations for inclusion in a wide range of responses.

2.1 Questionnaire

A questionnaire was designed and piloted in the UK (MF) and agreement was sought by the working party to disseminate across the participating countries. It was agreed to complete the survey in the English language though it was appreciated that this may exclude some groups. One group (Holland) translated the questionnaire and the resultant responses (HK). The survey contained two directed questions to illicit the working knowledge of the group of PHP in various countries. The question areas targeted:

- a) known benefits of SPH programmes and how a financial value could be assigned to the item,
- b) costs of implementation of SPH programmes in any organisation and how a financial value could be assigned to the item

Due to the inclusive nature of the survey, information was given in a covering letter that allowed participants to complete the forms individually or following a group discussion. The information directed the participants to consider an ideal situation and to forget the restrictions found in their organisations or under their local or national, information restrictions which are well known.

2.2 Data collection

A convenience sampling method was employed. All members of IPPHE represent their various national professional groups and this forms the basis for the cohort. The survey was disseminated across all 22 members IPPHE panel. Reminders for participants were sent via the local contact point on two separate occasions. Particular groups showed high levels of commitment to the survey (Veterans Affairs USA, New Zealand patient handling network MHANZ, a UK patient handling research network LARF, the Ergo-Coach network Holland, a professional PHP network ASPHP USA). All responses were sent directly to the researcher (MF) in email form. All responses were reviewed and the analysis was completed for content and theme as completed in Fray and Hignett (2013). This analysis was to report the profile of items that were recognised as being important to be included in the project moving forward and specifically to create definitions of the items that are to be included.

3. Results

47 survey forms were returned, representing 74 individuals from 9 different countries, and analysed across the 3 month data collection period. UK, USA, Holland and New Zealand were the most frequently represented (Table 1). All participants completed the distributed data collection form to allow a simple content and thematic analysis. The survey forms for the Holland sample were translated to allow the completion in the native tongue. All the Holland responses were translated (n=22, HK) for analysis by the researcher (MF). The responses were analysed for content and thematic relationships within the structure of the questions requested.

Table 1. Survey Returns.

Country	Number of responses	Number of individuals
USA	10	19
UK	6	12
Holland	22	22
New Zealand	4	11
Finland	1	4
Spain	1	1
Germany	1	1
Sweden	1	1
Australia	1	4
Totals	47	74

The questionnaire format required each participant to offer their opinions on the key items to be included in the two categories of benefits and costs of a SPH programme. Table 2 reports the number of items identified across the sample.

Table 2. Volume of data collected from the survey returns.

Country	Number of items	Number of measures
Costs of implementation	138	334
Benefits of SPH	205	567

There was more detail delivered in the sections identifying the benefits of the SPH programme than the costs. It was specifically noted that most of the items reported focussed on a common range of areas that

were common to many of the participants. There were some language differences that were interpreted by the researcher and there were several items that were based on local differences for reporting, legal procedures/structures etc. Table 3 shows the key items that were noted in the analysis of the survey responses for the noted benefits of SPH programmes.

Table 3 Items identified to support the benefits of SPH programmes

Benefits	Costs	Others
Staff sickness absence	Equipment provision	<u>Benefits</u> –communication, training time, income generation, better equipment management, organisation image
Patient injury/accident	Equipment maintenance	
Quality of care	Training for PHP	
Length of patient stay (LOS)	Facility Design	
Long term effects on staff	Facility re-design	
Patient falls	Others	<u>Costs</u> – Project management, observations in workplace, risk assessment, audit
Improved patient mobility		
Staff morale		
Efficiency in care delivery		
Others		

Responses identified a better understanding of the costs for implementation than the financial representation of the benefits. There was a clear focus initially on the reduction of costs of staff injuries and reducing the effects of sickness absence time (for short and long term conditions) which was supported by broader concepts of maintaining organisational image and staff morale to keep the profile of the organisation high in the local marketplace for patients and new staff recruitment. A wider range of items were suggested for the patient benefits, contradictions were found in the philosophies of many of the items and measures suggested between positive improvements or the reduction of loss. E.g. reductions in injury or accident numbers against improved mobility and shortened hospital stays.

Table 3 also shows items that were suggested for the costs of SPH programmes. The most familiar responses supported the regular types of PHP actions, purchase of equipment, changes to the working environment and the costs of delivery of training and workplace supervision. Only small numbers of responses included any reference to the management costs of these items which was perceived as an omission. It has long been recognised that the investigation, report writing, legislative responses for accidents and in particular patient injuries is significant and needs to be included in costing structures. Short demographic details of the participant groups were collected and there was some suggestion that the role and position of the participant had some effect on the type and detail of the responses in the survey (E.g. USA vs NL). The differences and similarities of the items and measures recorded are explored further in the discussion below.

4. Discussion

A wide set of items and measures were reported for the costs and the benefits sections. The content analysis listed all the different comments for costs and benefits questions separately. Themes and patterns were identified by the researcher to explore the reported items. Key themes that raised concern for the development of the cost benefit method are explained below:

4.1 Costs vs benefits

The 'benefit' items suggested in this survey matched the format suggested in previous studies (Fray and Hignett, 2013), i.e. Staff, patient and organisational categories. Figure 1 shows the key items and how each item can be represented in multiple categories. The measures that were suggested to quantify the costs for each item suggested that there was a linked nature to many of the effects that were considered to be as a result of improved SPH. The provision of a suitable mobility aid with trained staff to assist improves mobility, this leads to improved function which could lead to a shorter patient stay. It is important to appreciate that there is a negative cascade in this system also.

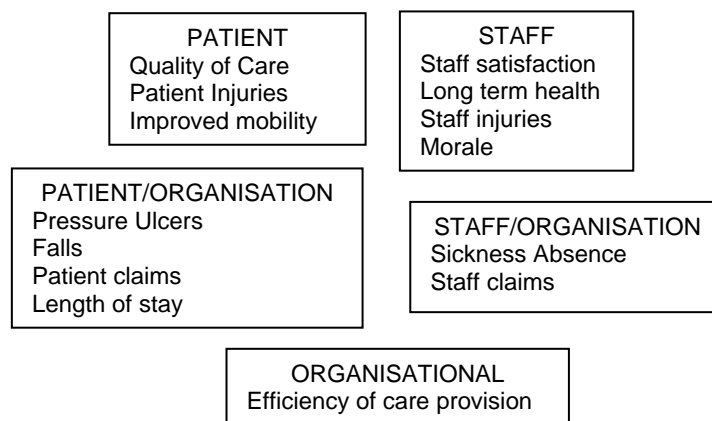


Figure 1. Some key items as staff, patient and organisational measures

The layout identifies that many of the measurement methods for each of the recorded items were complex. Table 4 outlines the list of measurement terms for the staff injury item. In addition the design of the

Table 4. Measurements for the 'Staff Injury' item

Measurement	Number of responses
Days/time lost	23
Claims	25
Insurance Premiums	18
Overtime costs and replacement staff costs	11
Low staff turnover rate	9
Preferred employer	6
Staff treatment costs	7
Reduced retirements	2
Staff working with restrictions	3

The 'costs' section reported a narrower list of items (Table 3). The range focussed mostly on the provision of SPH solutions with the provision of equipment, maintenance of equipment and the delivery of training to support the safe methods most reported. Almost all participants did not consider the expense of their own role in the organisation. Participants 18 and 19 reported the costs of the PHP, two included administration costs to aid the PHP (5 and 16), only one included the costs of taking people out of service to train them (17). This protected view may be linked with their role in the organisation.

4.2 Positive vs negative values

There were many items that were measured in both positive and negative terms. This dichotomy is often reported in clinical activities and in the language that describes safety systems. The aim of many safety systems is the absence or reduction of loss. This reduction of loss is a clear alignment with the Safety I vs Safety II discussion (Hollnagel, 2014). The patient benefits in particular showed this bi-directional effect. The effects of rehabilitation were described as improvements in function or improved mobility by some participants but there were many more who reported a reduction in falls. The measure of LOS for an individual patient also had this effect and can be explained by improved function and positive changes to mobility reduces the length of stay but not having timely rehabilitation or poor handling leading to falls or slow functional gain means a longer stay. Similar effects are noted with the development of a pressure ulcer.

4.3 Role of PHP

The range of participants that responded to the survey covered a wide range of job types and roles (students, PHP, safety officers, educators, SPH trainers etc). It was a positive effect to be able to incorporate the views of this range of occupational positions. It was evident that the position in an organisation related to the type

of responses given. People higher in the organisation reported audit and monitoring data as measures but lower level individuals suggested more physical measures. There was often a specific clinical bias to the measures e.g. orthopaedic rehabilitation, intensive care or community practice.

4.4 Country differences

The differences between the responses from different levels an organisation was compounded by the country of origin. Differences in the accident and incident reporting structures, claims and litigation, the role of the PHP all showed in the range of responses. Specific examples were seen from the data from the Dutch cohort. The very well defined and supported systems lead to many answers suggesting that all costs were incorporated in the normal practice and could not be calculated as a separate value. The UK and USA models showed that each location had to cost and request funding for interventions so had a much clearer view of the costing process.

4.5 Specific conditions vs general cost structures

The analysis of the reported items and measurement methods required the creation of definitions to simplify the structure of the lists. One area where re-focus was required was on the selections of specific conditions. Some responses used broad definitions e.g. improved mobility, condition management, efficient treatment. But some participants identified specific outcomes that may have been as a result of poor patient handling or mobility management e.g. falls, pressure ulcer formation, skin tears, ICU stay time, pneumonia and one response used the medical term of 'referral'. It was decided to use this structure to create a Patient Condition item to allow all the possible positive and negative effects to be included. This would be matched with a Staff Condition item.

4.6 Included items

The analysis of all responses allowed the following list of definitions to be constructed to outline the key items for inclusion in the next stage of the collaborative project. This template identifies the items that will be costed to quantify the positive and negative sides of the financial investment.

Table 5. Definitions of Key Items for Inclusion

Item	Definition	Quantities/Measures
Benefits		
Staff Condition	The reduction in the numbers and severity of staff	Number of injuries, Days/time lost, Claims, Compensation costs, Insurance premiums, Replacement staff costs, Reduced turnover rate, Staff treatment costs, Reduced retirements, Staff working with restrictions
Patient Condition	The reduction of negative effects of poor SPH provision	Falls, Legal fees/claims, Number of injuries Medical/treatment costs, Patient deaths, Subluxations, Pressure ulcers, Infection, Reduced pneumonias, Skin tears/damage
Quality of care	The improvement in patient conditions and rehabilitation	Employee satisfaction survey, Patient satisfaction survey, Complaints, Improved patient mobility and function, Pressure ulcers, Improved pain scores, Decreased medication requests, Decreased patient referrals, Awareness of co-morbidities, Reduction of immobility conditions, Reduced therapy costs/time, Reduction of ventilator days, Decrease ICU days
Length of patient stay (LOS)	Reduction in care costs from improved care or reduced accidents	Improved mobility/function, Re-admission rates, Decrease injury rates, Decreased complications, Reduced days, Fees for delays
Efficiency in care delivery	Organisational benefits for throughput	Efficiency, More time to deliver care, Reduced carer numbers (single carer packages), Reduced visit numbers, Increased treatment numbers
Costs		
Equipment provision	The costs for equipment solutions	Equipment purchase, installation, training and support
Equipment maintenance	On-going costs for maintaining the SPH solution	Parts, engineer services, slings, planned preventative maintenance

Training solutions	All costs for delivery of training for workforce	Rooms, materials, staff time, equipment
Training for PHP	The facilities to support the skills and competence of the SPH specialist	The costs to deliver a SPH service with a competent professional, time, CPD and training costs, administrative support
Facility Design	Workplace adaptations and upgrades	Architects, design costs, build and re-build costs

4.7 Critique

This study was delivered across an international participant group with no funding for completion. Though invitations to complete the survey were distributed widely across the various countries and in particular the professional groups representing PHP the response rate was low. The exploratory nature of the study supported the inclusive nature of the analysis and the breadth of the responses covered most of the areas that were expected by the researchers. The roles of the PHP and their level or position in their organisation had an effect on the types of responses but the range of individuals represented a wide spread of individuals so added to the strengths of the study. The translation of one survey and responses from one country was a methodological limitation but the added approach from another country added additional material to the study.

The researcher considered that the multiple participant completions (n>2 participants) gave a clearer and more detailed set of responses which suggested that structured focus groups might have been a more suitable method for this type of complex topic. The recording and subsequent transcription of a group discussion could have allowed a more creative flow of thought for the participants and a deeper analysis of all suggestions.

5. Further Work

The method and the structure of the survey has proved to be a support to the wider project as it has shown that there is a wide level of knowledge and a wide range of focus across the cost benefit analysis of SPH programmes. The cost benefit tool to be developed will need to take account of all these different aspects and be clear and concise to allow the PHP to be able to both collect the data and use the outputs of the method to improve their SPH programme.

A simple structure has been provided which can be developed in the next phase of the collaboration. This template describes the outline items that could be recorded within most care delivery organisations. Further work needs to define the specific content and values that are to populate the template for the cost benefit analysis.

Most importantly it is essential to be able to support the possible benefits outlined with clear research based evidence. This must show that if a comprehensive SPH programme with equipment, the provision of competent and compliant care staff and a robust organisational system to support the delivery of SPH in a care setting is directly related to possible improvements. It is this improved epidemiological, staff, patient, organisational and personal information which will add strength and validity to the use of a prospective cost benefit models and give SPH the credibility that its supporters and practitioners believe it deserves.

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