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The utilisation of risk-based frameworks for managing healthcare waste: A case study of the National Health Service in London

Alex Akpieyi [a], Terry L. Tudor [b,*], Cleber Dutra [c]

[a] Faculty of Health and Medical Science, University of Surrey, Guildford, Surrey GU2 7WG, UK
[b] School of Science and Technology, University of Northampton, Northampton NN2 6JD, UK
[c] Department of Management, Universidade de Fortaleza (UNIFOR), Fortaleza, Ceará, Brazil

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ABSTRACT

The management of waste from healthcare facilities can potentially pose a significant risk. In the UK, there are a number of increasingly stringent pieces of legislation and policies to mitigate against these risks. Using the taxonomy of organisational change (Vuuren, 1998), this study evaluated the inherent risks within the reported practices and policies of 21 Acute Care Trusts within the National Health Service (NHS) in London, England. The most frequently occurring exposures involved contact with sharps, infectious agents and hazardous substances; personal injuries during waste handling; manual handling injuries; slips, trips and falls; and striking against or being struck during procedures. Approximately 65% of the reported exposures occurred within the wards and for this location, highly significant correlations were found between nurses and contact with sharps. The implications of these findings for risk management are also discussed.

1. Introduction

The effective management of the infectious (clinical) fraction of healthcare waste (HCW) in the UK has increasingly gained attention over the last two decades, due to the need for compliance with increasingly stringent legislation and policies (Townend et al., 2009; Tudor et al., 2010; DH, 2011). HCW are the by-products of healthcare activities, comprised of: sharps, non-sharps, blood, human tissue, chemicals, pharmaceuticals, medical devices and radioactive materials (WHO, 2007). Clinical wastes are defined in the UK, in the Controlled Waste (England and Wales) Regulations 2012, as waste from a healthcare activity (including veterinary healthcare) that: (a) contains viable micro-organisms or their toxins which are known or reliably believed to cause disease in humans or other living organisms (b) contains or is contaminated with a medicine that contains a biologically active pharmaceutical agent (c) is a sharp, or a body fluid or other biological material (including human and animal tissue) containing or contaminated with a dangerous substance within the meaning of Council Directive 67/548/EEC on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances and waste of a similar nature from a non-healthcare activity.

The management of clinical waste can present significant physical, chemical and microbiological risks to those involved in the handling, treatment and disposal processes (Salkin, 2004; HPA, 2008; HSE, 2011a). Indeed, sharps accounted for some 68% of all percutaneous injuries (HPA, 2008). However, while there has been much work undertaken on clinical staff, there has been limited empirical research of ancillary staff (HSE, 2011a). Using a case study approach of the 21 Acute Care Trusts within the National Health Service (NHS) in London, England, this study aimed to examine the use of selected risk management tools for the management of waste from healthcare facilities.

1.1. The NHS

The NHS is one of the largest organisations in the world, employing approximately 1.7 million people, over half of whom are directly involved in healthcare service provision (NHS, 2014). The average number of days lost per worker due to injuries and illnesses in the health and social sector is amongst the highest across all sectors at 1.78, compared to an average of 0.98 (HSE, 2013a). This translates into lost-time of approximately £1 billion per annum (HSE, 2010). At the time of the study, the healthcare services in London employed a workforce of over 200,000 employees (NHS, 2008).

* Corresponding author. Tel.: +44 01604 893372; fax: +44 01604 893071.
E-mail address: terry.tudor@northampton.ac.uk (T.L. Tudor).

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2. Risk management

Of the 156,000 incidents reported between 2004 and 2005 under the *Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995* (RIDDOR), only 61 fell into the 'reportable incidents' category. This figure, however, does not reflect the 'numerous' minor sharps injuries that occurred in the healthcare sector, which were either considered low risk or resulted in less than three days lost time (HSE, 2011b). In managing HCW, emphasis is placed on managing the intrinsic risks that HCW poses to the environment and the persons frequently exposed (DH, 2011). Studies suggest that systems for managing the associated health and safety risks may be inadequate (HPA, 2008; HSE, 2011a; HM Treasury, 2013).

In high-risk industries (e.g. chemical, nuclear and oil exploration), predictive tools and models have for some time been used to proactively manage risks, through for example hazard mapping (Reniers et al., 2005; Kennedy and Kirwan, 1998; Vuuren, 1999).

The OSH Framework Directive (1989), is the key EU Directive covering health and safety (EU, 2013). In addition, there are a number of individual directives which define how to assess risks and, in some instances set limit values for certain substances or agents. A series of EU directives based on Article 114 of the Treaty on the Functioning of the European Union (ex Article 95 TEC) also relate to safety and health (EASHW, 2013).

Implementation of the directives in the UK is through the Control of Major Accidents Hazards (COMAH) Regulations 1999. These regulations prescribe the principle of risk elimination and reduction to levels as low as reasonably practicable (ALARP) (HSE, 1999). Specifically related to sharps waste are the health and safety (Sharps Instruments in Healthcare) Regulations 2013 (HSE, 2013b).

2.1. Risk management tools

A taxonomy of organisational failure applied to clinical risk management found that the majority of the patient-safety incidents (45%) were caused by organisational and management failures, while human factors, relating to incorrectly carrying out tasks, followed closely (Vuuren, 1999).

Over the years, a variety of qualitative, quantitative, deterministic and probabilistic risk analysis techniques have been developed (Khan and Abbasi, 1998; Tixier et al., 2002; Vaurio, 2010). The most common of these include (Khan and Abbasi, 1998; Tixier et al., 2002): Hazard and Operability Study (HAZOP); Failure Mode and Effect Analysis (FMEA); and Bow-Tie Analysis (BTA). The techniques are all aimed at forecasting and analysing the consequences of likely accidents, and emergency preparedness. FMEA and FTA have been applied in clinical settings as a means of achieving clinical governance in the area of error reduction, and improving patient safety (Paparella, 2007; Cagliano et al., 2011; Chiozza and Ponzetti, 2009). According to Paparella (2007), the use of FMEA allows for a proactive assessment of what things could go wrong in a system, and provides an opportunity to rectify the weak links before failures occur. FMEA and ETA are increasingly being considered outside of their traditional environments, including waste management (Pollard et al., 2006). FMEA is a particularly appropriate technique for managing the hazards of HCW, due to its underpinning in the proactive, rather than reactive assessment of the risks (Cagliano et al., 2011).

3. Methods

Between June and August 2011 incidences of patient safety and HCW-related risks were obtained through Freedom of Information (FOI) requests submitted to the Health and Safety Executive (HSE), the Department of Health (DH), the National Patient Safety Advisory (NPSA), the HPA, and each of the 21 NHS Trusts. The effective response rate obtained was approximately 33%.

The relevant types of data were established based on the taxonomy of organisational failure (Vuuren, 1999). However, the research utilised the historical data on patient safety-related risks to develop a failure taxonomy, which was thereafter tested against the data on the HCW-related risks.

3.1. Incidences of patient-safety related risks

In July 2011, FOI requests were sent to the DH and NSPA regarding incidences of medical error reported, for the period January 2009 to December 2009.

3.2. Incidences of HCW-related risks

In July 2011, FOI requests were sent to the DH, HSE, HPA, and each of the 21 NHS Acute Trusts regarding incidences of health and safety risks from HCW for the period January 2005 to December 2009.

3.3. Review of trust' health and safety policies

The evaluation criteria for the review of the Health and safety policies for each of the Trusts were based on (Pollard et al., 2006). To ensure consistency, the focus areas identified from each policy review was carried over to the next, and any new areas noted and included for subsequent reviews. Also, as the means of implementation was often not precisely stated, a list of the four most commonly observed implementation methods was subsequently employed.

3.4. Data analyses

The data were analysed using the Predictive Analysis Software (PASW) Statistics application using a range of descriptive and bivariate analyses. In categorising data, it is important to first identify the recurring regularities in the data and then decide what elements fit together (Patton, 2002). Therefore the analyses sought to determine and establish the relevant categories. This involved creating common themes by assigning codes to the various data elements, and grouping data sets to form themes. The thematic analysis of the incidences data was guided primarily by the questions that the FOI requests sought to answer (Stake, 1995). This approach resulted in the identification of four data categories: incident types; incident severity; staff category; and root causes.

To identify patterns and trends, a coding scheme was developed, by assigning alpha numeric values to individual data elements, for use in reviewing the health and safety policies. This content analysis enabled the documents to be broken down into discreet parts for contextual examination in relation to the predefined, coded evaluation criterion.

Triangulation was achieved by comparing and cross-checking the consistency of the analysed information on the incidences of HCW-related risks with that of the health and safety policies, based on (Patton, 2002). The results were generalised using analytic generalisation, rather than statistical analyses to establish a pattern-model theory between incidents and causes (Marschan-Piekkari and Welch, 2004). This comparison served to validate the applicability of the patient safety risk management techniques in a HCW management context, on the basis of common classifications of causes of failures.