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Recovering value from used medical instruments: A case study of laryngoscopes in England and Italy

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ABSTRACT

The healthcare sector has a relevant environmental footprint because of the significant materials throughput, the hazardousness of certain wastes it generates and the energy intensive treatment necessary to manage them. Using semi-structured interviews carried out with stakeholders from hospitals in England and Italy, this study sought to understand how best to recover value from used laryngoscopes. The findings suggest that despite differences in the use of single use instruments and the presence of a dedicated waste management department, sites in both countries face similar challenges, including limited communication between procurement and waste management staff, staff engagement, and end markets. The implications of these challenges and strategies for overcoming them are discussed.

1. Introduction

Within recent years, the concepts of the circular economy, including recovery of the intrinsic value of materials, have gained progressively more attention (Moscato, 2009; Pinjing et al., 2013; UNEP and ISWA, 2015). Effective waste segregation and treatment can enable the reintroduction of materials in the economic chain, as reusable or recycled goods or in place of raw materials (UNEP and ISWA, 2015). The EU Waste Framework Directive represents a step towards a circular economy through the incorporation of a waste hierarchy in the decision-making process, aiming at the promotion of value recovery from waste, through minimisation, reuse and recycle and the reduction of disposal (European Commission, 2008,2014). Similarly, also national governments are trying to incorporate the concept into their national policies, by promoting green purchases and sustainable waste management practices. For example, the United Kingdom (UK) has sought to foster the transition to a 'green economy' at national and local levels (Defra, 2011). The Italian Government has also published the official guidelines for the national green public procurement policy (Italian Ministry of the Environment, 2006). While the Public Service Act in England requires commissioners to hold into consideration the environmental value, together with the economic and social ones, when buying goods for public services (Public Services Act, 2012). The decision-making process at the stages of purchase, use and disposal have inevitable repercussions for the type and amount of wastes produced, the risks to individuals and the environment, and the potential for value recovery (Haas et al., 2015; Castellani et al., 2015; Caniato et al., 2015; Ghisellini et al., 2015).

Although statistics concerning healthcare waste production and disposal at national level are available (e.g. on the websites of the Italian Ministry of Health and the English Health & Care Information Centre), there is limited information on how best to ensure value recovery in the management of used medical instruments. Therefore, using a case study approach, this study aimed to examine strategies for enhancing the recovery of value from laryngoscopes in Italy and England.

2. Managing healthcare waste and used laryngoscopes

Healthcare facilities produce a very wide range of waste streams, some of which are hazardous, but most are non-hazardous. Indeed, more than 80% of the waste generated in hospitals worldwide can on average be defined as 'general waste' (WHO, 2014). Good segregation is a key factor in limiting contamination, and containing risks (including the spread of infections), and reducing the quantity of waste treated as hazardous (Chaerul et al., 2008; Windfeld and Brooks, 2015; De Feo and Malvano, 2009; Di Maria and Micale, 2014; Eriksson et al., 2005).

Greater sustainability within healthcare can be facilitated through green purchasing (Kaiser et al., 2001; Bergsma and Sevenster, 2013), having a dedicated waste manager (Tudor et al.,

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2010) and effective segregation and management of the waste (Windfeld and Brooks, 2015; Lee et al., 2004).

The legislative background on which the English and Italian health care waste laws have been developed is the European Waste Framework Directive (WFD) (European Commission, 2008). The WFD suggests the need to manage all types of wastes without endangering people and the environment and according to a hierarchy, aiming at recovering as much value as possible from it. In England, the Waste (England and Wales) Regulations mandates separate collection and that the segregated streams should undergo recovery operations (Defra, 2012). In addition, the Hazardous Waste Regulations outline stringent guidelines that must be followed when managing, transporting or treating hazardous waste (Defra, 2015). Lastly, the Medical Devices Regulations prescribes that consignment notes must be duly filled in including not only the components of a device but also the eventual presence of a battery (DH, 2013).

In the Italian legislation, the legislative decree DLgs. 152/2006, as amended by the DLgs. 205/2010, states that the first objective of a sound waste management (including healthcare waste), is precaution, namely the protection of the health of patients, operators and all people involved (Italian Government, 2010). It also explicitly includes the safeguard of the environment and the reduction of wastefulness as essential recommendations that operators should follow. The D.P.R. 254/03 on clinical waste, called "special waste", is another key regulation in the field (President of the Italian Republic, 2003). The decree outlines seven different waste streams that fall under the definition of clinical waste, and how they should be stored and transported (Cottone and Cottone, 2008). In addition to this classification, it establishes that the recovery of value from certain streams, such as non-hazardous metals, should be incentivised (APAT, 2008).

A further fundamental aspect of hazardous healthcare waste management concerns the sterilisation of potentially infectious and contagious devices. The overarching piece of legislation is the European Directive 93/42 on Medical Devices, introduced in the Italian legal system through the Legislative Decree 46/97 (Scaini, 2010). The decree sets out the minimum acceptable requirements that sterilisation must satisfy, including the safeguard of patients' and other people's health, and the efficacy and reliability of sterilised instruments. Another important aspect that comes into play is the purchase of medical devices. This subject is covered by the "*Piano d'azione per la Sostenibilità Ambientale dei Consumi nel Settore della Pubblica Amministrazione*" (the action plan for the environmental sustainability of consumption practices within the public administration sector), a non-compulsory strategy issued by the Italian Ministry of the Environment together with the Ministry of Economy supporting green procurement in public administrations. The input to these guidelines comes from the European Union, which in 2001 issued the European Communication n. 274/2001, the most important document on green public procurement (Testa et al., 2012).

2.1. Laryngoscopes

The present work focused on laryngoscopes, which are medical devices inserted into the mouth during a procedure to obtain a view of the patient's vocal folds or glottis (Fig. 1).

Several reasons lay behind this choice. First, the high quality of the metal present in surgical instruments represents a valuable material to recover, as they are typically made from stainless steel (Ibbotson et al., 2013). Second, the presence of a battery inside the laryngoscope. Batteries, if incinerated, could explode (DH, 2013) and contribute negatively to the noxious emissions of the treatment plant (Xará et al., 2015). This means that laryngoscopes, no matter

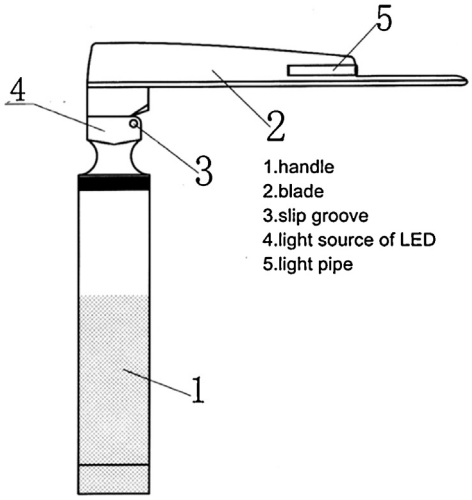

Fig. 1. A basic laryngoscope.
Source: http://about-surgical-instruments.blogspot.co.uk/

if single use or reusable, should ideally be disassembled and the components effectively segregated (Dahlén and Lagerkvist, 2010).

Before being utilised – unless new – non-disposable laryngoscopes must be sterilised. Given the inevitable contact with mucosae, used laryngoscopes have to undergo either high temperature sterilisation or disinfection (Scaini, 2010). This process is very energy intensive and can create a significant environmental footprint, depending on the energy source of the hospital (McGain et al., 2012). There is widespread support for the use of reusable over disposable from an economic point of view (Deprez et al., 2000; Adler et al., 2005; Morrison and Jacobs, 2004; McGain et al., 2012; Campion et al., 2012). However, the economic efficiency depends on the number of times a device is used (Yang et al., 2000).

During use, as the instrument gets into contact with sensitive and receptive body parts such as the mucosae of the mouth, they can potentially become infectious both for staff and patients (Williams et al., 2010; Simmons, 2000). Even when using disposable scope blades, reusable handles can still represent a possible source of contamination (Call et al., 2009; Williams et al., 2010). However, some medical products (e.g. single use versus reusable), are often preferred to others more based on anecdotal information and opinions, rather than on actual evidence (McGain et al., 2012).

3. Methods

Several potential interviewees in both England and Italy, with key roles in the waste management or in the purchase department of a hospital, were initially contacted through known acquaintances of the research team. In the end, three sites for each of the two countries were selected, based primarily on access and the availability of data. Therefore, as it is often the case with interviews, the sample size was relatively small and was repeatedly adjusted (Denscombe, 2010). Face-to-face semi-structured interviews conducted in the respondents' offices were chosen, based in part on previous studies (Tudor et al., 2010). The interviews in England were conducted during May 2015, while in Italy they were conducted from July to the beginning of September 2015. The questions were sent to the interviewees beforehand, along with a consent form and participant information sheet, as well as potential dates for the interview. Three interviews each were undertaken in Italy and England, giving a total of six interviews. Ethical approval for the study was granted by the School of Science and Technology at the University of Northampton.