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Understanding and knowledge of sustainable waste management within the neonatal unit: A qualitative investigation

Abstract.

The literature identifies a need for healthcare organisations to reduce the quantities of waste they generate, their carbon footprints, financial costs and adverse environmental impacts.

This paper discusses a qualitative investigation carried out within a neonatal unit (NNU) using semi-structured interviews with staff with the intent of gaining a greater understanding of their knowledge around sustainability, their waste management practice and to identify opportunities in relation to potential sustainable waste management interventions within the NNU.

The research was sited in a NNU within a United Kingdom (UK) district general hospital. Five semi-structured interviews were carried out with key informants recruited from the nursing staff based within the NNU.

Results indicate that NNU staff are aware of cost and environmental issues surrounding healthcare waste management and are willing to consider and adopt changes in practice intended to make financial savings and manage waste sustainably. This may be facilitated by the use of some form of continuing information feedback system and use of sustainable waste management interventions that change the management of waste within the neonatal unit.

Keywords

Waste. Sustainability. Qualitative study.

Introduction.

The need for prudent conservation and careful use of costly resources is recognised within the literature (Richardson et al., 2009; Nichols, 2014; Pencheon, 2015), similarly there is increased recognition that the National Health Service (NHS) and other healthcare providers need to reduce their waste, their carbon footprints and their subsequent adverse environmental impacts (Manzi et al., 2014; Pencheon, 2015). In 2012 it was estimated that the United Kingdom (UK) NHS had a carbon footprint of around 20 million tonnes of CO₂E (NHS Sustainable Development Unit, 2012) a sizable portion of this originating from transportation and management of waste. In addition to the environmental costs of waste management, the financial costs to healthcare providers also need to be considered. In their investigation of bagged waste in health care settings, the Royal College of Nursing (RCN 2011) found that it cost over £65 million to manage forms of waste that might typically be found within healthcare settings e.g. non-hazardous municipal waste, non-hazardous offensive waste and infectious waste. A key finding of the RCN report was the potential yearly saving of around £5 million in the NHS if improved classification and segregation of waste achieved a 20% reduction of infectious waste generated. Pencheon (2015) claims that in 2014 the NHS spent over £113bn of public money, with much of this according to the RCN (2011), spent on waste management practices that were themselves wasteful and expensive. Pencheon (2015) goes on to claim that climate change caused by the release of pollutant gases into the atmosphere via the burning of fossil fuels is the greatest threat to health in the 21st century, but it could also be argued that, ironically, this health threat is also contributed to by the incineration of clinical waste produced by healthcare organisations. In addressing this problem it could be contended that healthcare providers have a duty to develop and implement policies, practices and procedures to enable them to reduce their environmental impacts, cut their unnecessary waste management costs and function in a more sustainable manner.

It has been claimed that the public are in favour of more sustainable healthcare provision, i.e. healthcare that meets the needs of the present without compromising the ability of future generations to meet their own needs (Van De Kerk and Manuel, 2008; Pencheon, 2015, Richardson, et al 2016). Pencheon (2015) argues that such sustainable healthcare providers could place the reduction of their environmental footprints at the centre of their sustainability aims with this as a key indicator of sustainability. Furthermore, improved efficiencies and more sustainable waste management could produce significant cost savings, provide an indication of the financial success of sustainable practices and change the way that healthcare waste is viewed, so that it is no longer considered something to be disposed of but may instead be viewed as a resource providing opportunities to generate funds from recycling or reuse (Nichols and Allum, 2015; Pencheon 2015). However, evidence within the literature suggests that reducing healthcare waste remains a low priority and requires greater attention and investigation (AOMRC, 2014; Nichols, 2014).

This paper reports on an investigation carried out within a neonatal unit using qualitative interviews with staff with the intent of gaining a greater understanding of their knowledge around sustainability and waste management practice. The interviews aimed to identify opportunities and limitations in relation to potential sustainable waste management interventions and changes in the management of waste within the neonatal unit. A specific focus was placed upon neonatology, as this area has been identified as being especially dependent on the availability of resources and technology and may consequently generate significant amounts of waste with subsequent environmental impacts (Nichols, 2013, 2014).

Methods.

Setting - The site of the empirical research was a busy neonatal intensive care unit (NNU) within a United Kingdom (UK) district general hospital. The site was selected for the research as it contained a relatively stable population of staff that would allow continuity of data gathering. The nature of the work carried out within the unit required staff, patients and visitors to manage waste safely and lawfully. Interviewing participants about this would enable research participants to demonstrate their waste management knowledge, beliefs, behaviours and attitudes.

Ethics - All staff based within the unit and the parents/visitors of neonates cared for on the unit were provided with written information about the project. Guiding principles for designing and carrying out research were adhered to, these included respect for all individuals involved in the research, valid consent, openness, honesty, right to withdraw, and confidentiality (Nursing and Midwifery Council's Code of Professional Conduct 2015). Written consent was obtained from research participants only after they had opportunity to consider the written information and question members of the research team. Patients, their carers or families were not involved in the research, but due to the involvement of NHS staff the approval and guidance of relevant national and local Research Ethics Committee was sought.

Interview method – A total of 5 visits were made to the NNU beginning in October 2015 and ending in January 2016. During these visits to the NNU 5 semi structured interviews were carried out with key informants recruited from the nursing staff based within the NNU. Interviews took place in private, on the NNU; each interview was typically around 30 minutes in duration. Participants were purposively sampled to obtain a breadth and depth of knowledge and opinion from nursing staff employed on the unit. Interviews explored participants' attitudes, beliefs, behaviour and knowledge in regard to management of waste. A topic guide was developed to facilitate the interview process. It was important to remember that the presence of the researcher might have affected the behaviour and responses of the interview participants and this was reflected upon during the interview process and during analysis of the results (Alvesson and Skoldberg 2000).

Analysis method - Field notes and interviews were digitally recorded then transcribed in an electronic format and analysed using qualitative data analysis software. Thematic content analysis (Mays et al 2005) was conducted in order to identify issues emergent from the data. Similar thematic analysis methods have been successfully used previously (Richardson et al 2009; Nichols et al 2013). The interview data was then sorted into emergent codes and categories (Creswell 1998). Rigour was ensured through a continuous, conscious and critical approach to the research design, its application, and its means of collecting, interpreting and communicating data and research findings.

Results.

Five distinct themes were seen to emerge from the interview data, each of these themes will be discussed in turn below.

Information and Knowledge

Participants were clear on how information and knowledge regarding waste management could influence their waste management behaviour in practice:

Interview 1

Getting people to think more about it and the cost, you know financial cost and the environmental cost would probably be good, sort of like an increased awareness. I think you get into the habit of doing what you've always done.... a lot of our stuff is just quickly just disposed and you don't think any more of it. I suppose if it was streamed more and you thought more about which bits were effective and which bits were actually not, that that would be beneficial I suppose, and it would be interesting as well to see how much, what a difference you could make.

A number of suggestions were made for providing further information for staff on waste management including:

Interview 4

I think posters and things above the bins, and visual things, even for the parents so when they wash their hands they put things in the right bin.

Another suggestion was continuing information on costs and carbon emissions resulting from the NNU's waste management:

Interview 1

We're all very aware of the current economic situation and the fact that the trust as well as the whole of the NHS is in a fairly dire state in terms of finances, so I think if you could show that actually you were trying to save costs on different things as well, I think that would have a beneficial impact, not only on the ward and us saying we're saving X amount, and also therefore, for the trust, but also on a personal level that

you know that you are actually not just wasting stuff, you've got finite resources haven't you, and actually decreasing your impact I think that would be a good thing to know. I think it would make people more likely to do it as well if they had a figure, like oh that was better, that's improved from last week.

This idea of continuing information and feedback on waste management performance was positively viewed by participants, for example:

Interview 3

If you could see how it's changing and the difference it's having on the unit and environment and everything else, yeah I'm sure it would help.

Interview 2

I think that would be quite good actually and then you could try and better it for the next time. Yeah I think goal orientated....and I think people work better with that, not like, well kind of like a challenge in a way.

The notion of continuing information and feedback on waste management and the possibility of reducing costs and potential to redirect funds back into the NNU budget was also recognised by participants:

Interview 4

If we can show that we're improving, and that we are being cost-efficient, then hopefully we could glean some of that money back.

It was clear that participants recognised the potential value of continuous feedback and information on their waste management as a means of saving funds; they also recognised this as a potential way of identifying savings made in waste management costs by the NNU and using this evidence to claim these savings back for the NNU budget and that money saved should not be lost within:

The whole child health budget, that it should come back to the neonatal unit, so if she's (NNU manager) got that evidence to present at the meetings, and it's something that the person in charge can always check on on a daily or weekly basis. (Interview 4).

Change in Practice

Participants were aware that to achieve cost savings and increasing efficiencies in their waste management, changes in practice would be required and some scepticism around the effectiveness and successful implementation of these changes was expressed, for example workload and time pressures were seen as likely to impede changes in waste segregation:

Interview 3

I think I would give it a go, and the reason I hesitate is if you're in intensive care and it's busy then it isn't actually practical, it's not feasible to be able to do that if you've got an awful lot going on, that's probably the last thing you're thinking about, you're just getting rid of your waste whatever it might be, in a bin. So as far as in the middle of all of it, having time to stand there and work out where it should go, honestly I don't know that there is time to do that when it's very busy, particularly when you've got admissions and lots going on.

In addition to workload issues participants also queried whether the clinical environment would have sufficient room in which to place additional waste bins to aid changes in practice, for example, in the segregation of waste:

Interview 1

*I think it's just a space issue, when you've got to have five babies in Nursery * for example, there is not enough room even for the nurse to get in let alone when you have parents and families and visitors, so I think the space issue is a really big issue and big barrier to implementing something that involves having extra stuff in the nurseries.*

However, despite the acknowledged limitations within the clinical environment there remained evidence of a willingness to make changes in waste management practice:

Interview 2

I think initially it might go the wrong way a few times, but I think long-term I think it could work, it's mainly for like space really cos if it's a smaller bin those ones in an hour they can get full up to the top, so I think a lot of it comes to space.

Despite the recognition of potential impediments to change, participants appeared to be willing to attempt to make changes in practice providing these changes did not negatively impact on patient care:

Interview 3

I should think so yeah, it's nice to see where it's going and what difference you're making by making those changes, it's just being practical at the time though.

Participants were clear that much of the motivation to make changes in practice was stimulated by their knowledge of the costs of waste management.

Costs

Interview 2

People think oh goodness me I can save money here, cos everyone knows every little helps and the NHS is in trouble anyway, so to save money it will help us out long term as well.

Specific waste management knowledge was revealed by participants, for example, in regard to costs associated with incorrect segregation of waste:

Interview 5

It's important that we put the right waste into the right bags because obviously some bags are more expensive being incinerated. I don't know the cost exactly but I know it's an extortionate amount compared to one to the other, I don't know the price but I know it's, I can remember hearing that it's really, really expensive.

However, there was an indication that despite some idea of the costs of waste management, a priority would remain the ability to find a bin in which to dispose of waste, regardless of whether this was the correct waste stream to use:

Interview 4

How much it costs the unit to deal with their waste I really don't know, I'm sure it's probably quite a lot of money, but on the ground-floor level I'm just more concerned about how full the bin is and getting it changed really than trying to put the right things in the right bin.

However, in further discussion of the issue of segregation of waste this participant expressed an opinion that the issue could successfully be addressed and costs subsequently reduced by a combination of staff education and increased availability to them of different waste streams and appropriate bins:

Interview 4

Well if we had more of the right bins in the right places, and if everybody was educated as to what these bins are for, then I think we probably could cut the cost.

One participant was clear on what she saw as the effect of expensive waste management practices, and perhaps summed up the need for the issue to be effectively addressed:

Interview 2

The knock-on effect - it does all add up really doesn't it, it does have an effect on us as a neonatal team as well if the hospital's financially in trouble it affects us and then potentially affects care then as well.

Recycling

In addressing the cost implications of waste management it could be suggested that recycling could help reduce expenditure and might also potentially provide some income. In regard to recycling participants gave some disparate views, for example:

Interview 1

I know that we obviously produce a lot of it (waste) and we also don't recycle a huge amount of it.

Interview 5

We aim to do a lot of recycling; I feel we do with babies' bottles, plastic bottles and glass bottles.

Overall, evidence suggested that some success had been achieved with recycling of materials typically used for non-clinical tasks:

Interview 5

We do the cardboard, we do the glass bottles, we do everything plastic, glass, metal, we do metal like tops and things like that.

However, there was evidence found suggesting that items used within clinical practice were less likely to be recycled:

Interview 1

We don't stream our recyclable waste, we do a small amount of recycling of bottles of formula and of cans and plastic cups, but otherwise the nursery waste isn't streamed in any way, so potentially if we had more room, or perhaps I don't know, a different way of doing it i.e. segregated bins or something like that, but that might be a way you might be able to stream that as long as there was all the education and stuff to make sure everybody knew.

Obstacles to more effective recycling were reported by participants. For example, it was felt that workload could reduce the likelihood of recycling occurring:

Interview 3

Very often we're so busy you just, you're doing what you're doing and you put it in the bin and you move on.....you haven't almost got time sometimes to think about where that's then going to go.

Others expressed a concern that extra bins to enable greater segregation and recycling of waste would impinge on the clinical area:

Interview 2

I think a lot of it is space really, like at the moment I'm in a tiny little room, there's only literally enough room for the one bin.

Another issue raised by participants was their inability to recognise information printed on items or their packaging indicating that the item or packaging was recyclable:

Interview 3

We mainly look at things like it it's one patient use only or it can be sent away to be sterilised and used again, but no I can't say I look and realise there's anything, it's the things that a lot of people don't know. I can't say I would know what to look for.

Segregation

The evidence suggested that within the NNU, a significant obstacle to achieving sustainable waste management practice was a lack of opportunity to segregate waste at the point of its generation within the clinical setting. Participants felt that this was primarily caused by a lack of space in which to place differing types of bins to enable waste to be placed into differing waste streams e.g. clinical waste or domestic waste:

Interview 5

It's all to do with space isn't it and if we had two bins obviously our waste would be a lot less money to pay.

Interview 2

A lot of it here at the moment is space really I think, for not having enough bin bags.

Interview 4

Well if we had more of the right bins in the right places, and if everybody was educated as to what these bins are for, then I think we probably could cut the cost.

Some suggestion of the extent of the unnecessary costs associated with poorly segregated waste was provided by one participant who was clear that much of the NNU clinical waste could in fact be safely disposed of in the less expensive to manage domestic waste stream:

Interview 5

Everything goes in there from soiled nappies, soiled dressings to paper towels that we wash our hands with, which obviously if it's going by how many times we wash our hands a day, probably two thirds of those yellow bags are filled with just literally paper towels that could quite easily go into a black bag.

However, there was evidence that given the opportunity and support, NNU staff would be willing to attempt to undertake sustainable waste management practices such as recycling and more effective segregation of their waste. Furthermore, the use of some indicator of the effectiveness of these changes, such as the use of continuous feedback and information discussed by research participants was also advocated:

Interview 1

The streaming of the waste would be one that's relatively easy to do, like it's not involving a huge amount of extra time on our part I wouldn't say, cos obviously sometimes we're very busy, and I could see if there was an indicator, if you had to sort of look at everything and split it into different components in order to recycle different bits I think that might be an issue. But I'd be happy to do anything that was proven to be effective.

Discussion.

The results above suggest that research participants employed on the NNU did have a knowledge of some of the issues around sustainable waste management. Participants acknowledged that there were limitations in their waste management practice, for example in regard to recycling and the correct segregation of waste. However, there was also evidence that these limitations could to some extent be attributed to a lack of resources and an unsupportive clinical environment and not necessarily to an unwillingness amongst NNU staff to change their waste management practice. On the contrary, evidence was found amongst participants of a readiness to make changes to improve waste management practice. A motivator for this readiness appears to be a knowledge amongst participants of the costs associated with inefficient waste management practice and some consequent desire to reduce these costs with the aim of redirecting any financial savings back into the NNU budget. Participants suggested that some form of continuing information and feedback on their waste management performance and any financial savings made could be used to stimulate behaviour change in regard to the waste management practice carried out within the NNU.

The use of continuing information feedback has been investigated elsewhere. For example, Pavel et al (2015) discuss the use of information technology, what they term as behavioural informatics, as a means of facilitating behaviour change. Pavel et al (2015) argue that this is a scientific process of monitoring behaviour, computational modelling of data and development of subsequent behaviour change interventions. Similar forms of information feedback and behavioural informatics may have been used effectively to enable change in individual patient or patient groups' behaviour. However the underpinning principles, theory and potential benefits of employing information feedback or behavioural informatics extend beyond patient care into education and clinical practice (Pavel et al 2015).

It could be suggested then that that some form of continuing information feedback system, as advocated by the research participants and informed by the principles of behavioural informatics, may be effective in stimulating and sustaining positive behaviour changes in waste management within the NNU. Such a system could for example investigate and monitor the content of NNU waste streams and then based upon this data suggest interventions to achieve positive changes. This combined with estimates of cost savings that could be made may be effective in promoting and maintaining sustainable waste management practices. It could be suggested that

further investigation into continuing information feedback systems, informed by behavioural informatics principles and theory, may provide a means of enabling sustainable healthcare waste management practice.

Conclusion.

This paper has reported on a qualitative investigation carried out within a neonatal unit with the intent of gaining a greater understanding of the NNU staff's knowledge of sustainability and waste management practice. The investigation took place in only one NNU and it would be unreasonable to attempt to generalise based upon the evidence gained from an investigation that took place in what may have been a clinical setting that had an atypical environment that lacked space and resources to aid sustainable waste management practice. This must be acknowledged as a limitation of the investigation. However, the investigation has provided evidence that NNU staff are aware of cost and environmental issues surrounding healthcare waste management and furthermore are willing to investigate, consider and adopt changes in practice with the intention of making financial savings and managing waste in a more sustainable manner. Participants expressed an opinion that some form of continuing information feedback may be effective in informing and supporting behaviour change interventions that intend to facilitate sustainable healthcare waste practice. The use of information feedback has similarly been advocated in the literature as a means of enabling behaviour change and arguably this provides an opportunity for further investigation in clinical practice.

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