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Stayt, L, Seers, K and Tutton, E

Patients' experiences of technology and care in adult intensive care

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ABSTRACT

Aims

To investigate patients' experiences of technology in an adult intensive care unit

Background

Technology is fundamental to support physical recovery from critical illness in Intensive Care Units. As well as physical corollaries, psychological disturbances are reported in critically ill patients at all stages of their illness and recovery. Nurses play a key role in the physical and psychological care of patients, however there is a suggestion in the literature that the presence of technology may dehumanise patient care and distract the nurse from attending to patients psychosocial needs. Little attention has been paid to patients' perceptions of receiving care in a technological environment.

Design

This study was informed by Heideggerian phenomenology.

Methods

The research took place in 2009-2011 in a university hospital in England. Nineteen participants who had been patients in ICU were interviewed guided by an interview topic prompt list. Interviews were transcribed *verbatim* and analysed using Van Manen's framework.

Findings

Participants described technology and care as inseparable and presented their experiences as a unified encounter. The theme 'Getting on with it' described how participants endured technology by 'Being Good' and 'Being Invisible'. 'Getting over it' described why participants endured technology by 'Bowling to Authority' and viewing invasive technologies as a 'Necessary Evil'.

Conclusion

Patients experienced technology and care as a series of paradoxical relationships: alienating yet reassuring, uncomfortable yet comforting, impersonal yet personal. By maintaining a close and supportive presence and providing personal comfort and care nurses may minimise the invasive and isolating potential of technology.

Keywords: adult, intensive care, nursing, qualitative research, technology

Summary Statements:

Why is this research or review needed?

- Nurses play a key role in both the physical and psychological care of critically ill patients in ICU
- There is a suggestion in the literature that nurses perceive technology in ICU as dehumanising patient care and distracting them from attending to the patients' psychosocial needs, however it is not known if the patients agree.
- The exploration of patients' experiences of care in a technological environment may highlight specific elements of nursing care that patients perceive to reduce stressors in ICU and support their psychological wellbeing and recovery.

What are the key findings?

- Patients experienced technology and care as an inseparable and unified encounter.
- Patients endured technologies by surrendering their agency and complying with the technological demands and routines whilst appreciating the expertise of caregivers and recognising the benefits and hope of survival that technology conferred.
- Patients experienced technology as a series of paradoxical relationships: inseparable from yet distinct to personal nursing care, impersonal yet personal, invisible yet well cared for, uncomfortable yet comforting, isolating yet reassuring and providing hope of survival.

How should the findings be used to influence policy/practice/research/education?

- By maintaining a close and supportive presence and providing personal comfort and care nurses may minimise the invasive and isolating potential of technology.

- Education and preceptorship programmes should aim to develop both technological competence but also intelligent kindness and communication skills which recognise and manage the psychosocial impact of technological interventions
- Future research may involve deductive exploration of specific technological stressors encountered by patients in ICU and factors which provide reassurance, hope and comfort to develop care strategies that minimise technological stressors and their impact.

INTRODUCTION

In the last few decades in parallel with and in response to an increase in the acuity and complexity of patients' healthcare requirements there has been a proliferation of technological advances in healthcare. Critical care environments such as Intensive Care Units (ICU) have seen numerous advances in life-saving technological interventions (Price 2014, Kongsuwan & Locsin 2011). As a result nurses have new responsibilities and require a more complex and varied skill set associated with technologies which invariably impact patient care (Crocker & Timmons 2009).

Patient care in the ICU is not just about applying and managing complex technological interventions to address physical needs. Patients endure an enormous amount of psychological stress (Desai *et al.* 2011, Griffiths & Jones 2011). Psychological stressors include sensory alterations such as hallucinations and delusions (Reade *et al.* 2011, Tate *et al.* 2011), sleep deprivation and impaired communication (Magnus & Turkington 2006). Patients report feelings of terror and great anxiety (Almerud-Osterberg 2010, Samuelson 2011). Psychological disturbances such as anxiety and depression, are frequently reported which may impair patient recovery (Ely *et al.* 2001, Roberts 2004). ICU delirium and Post Traumatic Stress Disorder (PTSD) may occur during and after critical illness (Girard *et al.* 2007, Reade *et al.* 2011). Occurrence of delirium and PTSD are associated with increased mortality, morbidity, duration of ICU stay and cost (Ouimet *et al.* 2007, Roffey & Thangathurai 2011).

The aim of intensive care is, therefore, not only to manage physical symptoms but to also support the psychosocial wellbeing of patients (Pattison 2005, Hofhuis *et al.* 2008). Indeed,

despite the rapid advancement of life saving technologies, compassionate care remains at the forefront of healthcare delivery and a core value and behaviour recognised by healthcare consumers and professional bodies (DoH 2012, Darbyshire & McKenna 2013, Paley 2014). In light of complex technological advances and associated changes in healthcare delivery it is important to explore patients' experiences of care. The purpose of this study is to explore patients' experiences of care in a technological environment such as an ICU.

Background

Defining technology

Numerous attempts have been made to define technology. Arguably technology is not a simple phenomenon to understand attributable to its multifarious role and function in society - in healthcare in particular. Martin Heidegger (1889-1976) pioneered a new way of thinking about technology and sought to explicate the essence of technology in his seminal paper 'The Question Concerning Technology' (Heidegger 1977). In alignment with Heidegger's 'being-in-the-world' which suggests that understandings of phenomena are embedded in a social, historical and cultural context, Heidegger describes technology as having *authentic meaning* where one employs and appreciates technologies to achieve a task or serve a purpose in a given context (Brassington 2007). Health technologies may be understood in terms of their functionality and efficiency of purpose. Heidegger warns of the danger of technology suggesting that its essence of functionality and efficiency may '*enframe*' human thinking and restrict appreciation of existential and artistic modes of being (Heidegger 1977, Page 9). Heidegger's philosophy suggests healthcare professionals are in danger of being blinded by the efficiency of purpose that technology proffers and lose sight of the humanistic and interpersonal aspects of healthcare. In alignment with the phenomenological design of this

study, participants formulated their own understanding of technology in the context of ICU to enable an authentic account of their experiences in their own frame of understanding.

Technology and Care

The overwhelming presence of technology in healthcare has a significant impact on patients, nurses and care (Locsin 2010). Technology has long since been an integral part of ICU as critically ill patients need specialized treatment and care involving support from technology (Alasad 2002, Wikström *et al.* 2007). Previous research has suggested that the presence of technology may distract nurses from the psychological care of patients (Hofhuis *et al.* 2008, McGrath 2008). Lee (2004) and Price (2013), in their respective qualitative studies, revealed that nurses perceive technology to place increased demands on their time, allowing less time in which to establish a nurse-patient relationship and to be involved in personal care. Noh's (2002) survey of surgical nurses in Korea revealed that they perceived technology as distracting them from providing adequate patient care. There was also a suggestion, that technology may make care impersonal, dehumanised and fragmented (Alasad 2002, Almerud *et al.* 2008). Wikström *et al.* (2007) suggested the risk that patients are not perceived as human beings in technological environments such as ICU. Wilkin and Slevin (2004) agreed and warned that the proliferation of technology may potentially threaten the caring component of critical care nursing. More recently, Kongsuwan and Locscin (2011) revealed that nurse participants, in their phenomenological study, described how using technology diminished their ability to connect with or relate to their patients. McGrath (2008) suggested that nurses favour managing technology and physical aspects of care rather than getting involved with the more personal and psychological care. Based on their phenomenological study of ten nurses who were interviewed about caring in a technological environment, Almerud *et al.* (2008, p132) made damning claims: '...it [technology] impedes any possible

close encounter and sabotages the intention of developing health-inducing interpersonal relations. It also compromises the caregiver's vision and shackles action...'

In contrast to the above, it has been suggested that caring is not only possible in ICU but it may be positively enhanced by nurses' mastery of technology (Walters 1995, Wilkin & Slevin 2004). Wikström *et al.* (2007) conducted an ethnographic study, which explored 12 Swedish ICU nurses' understanding of technology and reported that technology may direct and facilitate decision making and patient care. This echoed the findings of an earlier ethnographic study conducted by Alasad (2002) who observed that technology allowed nurse participants to feel safe and in control of their patients' care. Price (2013, Page 282) described 'vigilance' in ICU where nurses perceived technology as enabling patients to progress towards recovery and stabilization. Almerud *et al.* (2008) and Ääri *et al.* (2008) also highlighted that mastery of technology is essential to the practice of critical care nursing. In addition, Kongsuwan and Locsin (2011) suggested that technological mastery incorporates compassionate caring. Similarly, McGrath (2008) identified that the nurse participants thought that excellence in nursing care was dependent on nurses' expertise and technological skill adding that technology enabled nurses to *know* their patients.

There has been much exploration of the nurse's relationship with technology and how they may reconcile technology with care. Studies exploring patients' experiences of ICU may indirectly or broadly refer to technology, as arguably, technology is innate to any experience of ICU. However, little attention has been paid explicitly to the patients' relationship with technology, in particular the patients' perception of how technology influences their care in a technological environment. Whilst the nurses may perceive technology as dehumanising and fragmenting the care they deliver, it is not known if the patient agrees. The aim of this study

was, therefore, to explore patients' experiences of technology in the context of their care in ICU. This investigation is important as it may highlight specific elements of nursing care that patients perceive to reduce stressors in ICU and support their psychological wellbeing and recovery.

THE STUDY

Aims

The aim of this study was to explore patients' experiences of technology in an adult intensive care unit.

Design

Heideggerian phenomenology, which aims to explore the lived experience (Van der Zalm and Bergum 2000), informed the design of this study. Heideggerian phenomenology considers that a person's understanding, perceptions and experience cannot occur in isolation from the persons' world (Earle 2010). Heidegger referred to this ontological perspective as *Dasein* (Heidegger 2010). *Dasein* which is translated as 'being-in-the-world' (Johnson 2000) means that an individual is inseparable from their social, psychological and historical context (Mackey 2005). A Heideggerian phenomenological method of inquiry, therefore, allows a holistic understanding of the individual experiences of technology in ICU and the multiple dimensions of being a patient in ICU to be revealed.

Participants' experiences of 'being-in-the-world' may only be interpreted by another 'being-in-the-world' (Lowes & Prowse 2001). The Heideggerian researcher does not attempt to gain an objective understanding of a phenomenon but adopts an emic position in the research process (McConnell-Henry *et al.* 2009). As such, no attempt was made to bracket prior

experiences and preconceptions. As a critical care nurse with experience of caring for critically ill patients in a technological environment, the researcher's emic position contributed to the contextual understanding of ICU and the data generated. Critical reflection of preconceptions initially guided the development of the interview topic prompt list. This enabled the exploration and explication of both the researchers' preconceptions and participants' actual experiences in the process of co-constructing meaning and understanding.

Setting and Sample

The research was conducted in a university teaching hospital in the south of England. The ICU operated a one to one nurse: patient ratio and specifically cared for level 3 patients requiring advanced respiratory support or support of a minimum of two organs (Intensive Care Society 2009). A convenience sample of all patients who had been in ICU for four or more days were invited to a follow-up clinic 12 weeks after discharge. Potential participants received a letter inviting them to participate in an interview either before or after their scheduled appointment. Patients who were unable to consent to participate, did not feel well enough to be interviewed or who did not speak English were excluded from this study.

Approximately ninety invitation letters were posted; nineteen patients responded and were subsequently recruited to participate. Data saturation was achieved at nineteen participants. It is not known why other invited participants did not respond to the invitation letter.

Data collection

Interviews were conducted by LCS in a private room in the out-patients department during 2009-2011. Some participants were accompanied by a family member, but it was emphasized that patients' experiences were the focus of the study. An interview topic prompt list

including key phrases relating to the phenomenon was used as an *aide memoire*. Prompts included: memories prior to admission, first recollections of being in ICU, memories of technologies, physical sensations and memories of interventions. Interviews lasted between 45 and 90 minutes, were digitally recorded and were transcribed *verbatim*. A reflexive journal was kept throughout the research process which critically reflected on my presuppositions relating to the phenomenon and the research process itself.

Ethical Considerations

Approval was gained from the ICU clinical leads, the hospital Research and Development Department and the National Health Service (NHS) Research Ethics Committee (REC No: 09/H0606/66). Verbal and written consent was obtained at the time of interview. Participants were allocated a number which was then used to label all tape recordings, research notes and quotations included in reports.

Data Analysis

Transcript and reflexive journal data were stored and organised using NVivo version 9. Consistent with the principles of Heidegger, the resulting transcripts were analysed by LCS using Van Manen's (1997) guidelines. Significant phrases were identified and categorised into preliminary themes. With continual reference to the original transcripts and the researcher's reflexive journal, themes were clustered and segregated, ordered and re-ordered until substantive themes were derived. Participant quotations that exemplified themes were selected. Participants were not asked to validate themes as the aim of this research was to conflate the accounts of all participants to shift substantive situations to a more generalised and theoretical discussion. Morse (1998) has stated that as theory is developed from a

synthesis of the perspectives of several participants it is inappropriate to expect individual participants to have the ability to 'validate' the findings of the research as a whole.

Rigour

The expressions of rigour described by de Witt and Ploeg (2006) provided a framework for ensuring rigour. Balanced integration was achieved by ensuring that Heideggerian tenets were considered and incorporated into every stage of the study. Openness was achieved by documenting the reflexive process in a diary and providing a clear audit trail of all decisions. The interview prompt list was piloted and reviewed by clinical experts and experienced researchers who supervised the project. Study findings and generated themes were discussed with the project supervisors, clinical experts and peers. Concreteness was demonstrated by the design of the study which aimed to strongly orientate the phenomenon of technology into the context of ICU. It is difficult to ascertain if true resonance occurs with readers however during analysis of these findings with the findings of other studies, resonance was indicated. The notion of actualisation suggests that phenomenological interpretation doesn't end when a study is finished as readers will continue to interpret findings in the future (de Witt & Ploeg 2006). Actualisation by definition has therefore yet to be realised.

FINDINGS

Participant Characteristics

Participants had an average age of 57.5 years (SD 12.4 years) ranging from 32-86, the average length of stay was 2.1 weeks (SD 0.9 weeks) ranging from 1-4 weeks. The average time since discharge from ICU at interview was 4.3 months (SD 0.8 months) and ranged from 3-7 months. Participants were admitted to ICU for a wide range of reasons including elective

post-operative admission, sepsis, pneumonia and trauma. All participants were white and English.

Overview of Themes

Participants gave a rich account of their experiences of technology and care in ICU. There were three key themes generated: Technology and Care, My Useless Body and Making Sense of It, which gave a broad insight into patients' personal perceptions of critical illness, coping strategies, their recovery and the social and organisational structure that prevailed in ICU. This paper reports the key theme relating to the aim of this research- Technology and Care. Figure 1 depicts an overview of this theme:

Inseparability of Technology and Care

In describing their experiences, participants' accounts of technology and care appeared to be inseparable. The two phenomena were not viewed by participants as being mutually exclusive as the presence and application of technology was taken for granted and recognised as being imperative to both their care and recovery. Most participants described how they felt that by attending to the technology, nurses were caring for them:

Because they were just... going out of their way to be so kind and caring... My own allocated nurses...just watched everything... A minute an alarm went they saw to it, the minute the numbers on the screen changed they checked it... Yes I felt very well looked after. (Participant 8)

Further to this, participants appeared to view nurses as an extension of the technology as they referred to a variety of technologies but frequently did not refer to the healthcare practitioner

applying and managing them. For example, many participants referred to being ‘suctioned’ and articulate their experiences of undergoing endotracheal suctioning at great length but do not distinguish between the technology used to perform this task and the person applying it:

Suctioning was the worst thing....I hated it. When I could feel phlegm in my chest I knew the tube would be coming... (Participant 19)

Participants were however able to articulate elements of nursing care where the nurse was distinguishable from technology. Interestingly participants appeared to equate nursing care with personal care:

Even things like washing my hair for me, cleaning my teeth... You know making sure that the personal things were looked after as well, not just the medical things. You know washing my face in the morning... It makes such a difference... and that is what I really appreciated. (Participant 13)

Getting On With It

Getting on with it describes *how* participants endured technologies in ICU.

Being Invisible

Participants often portrayed themselves as being invisible relative to the technologies present. This sentiment was reflected in participant reports of impersonal care where healthcare professionals appeared to be more interested in the technologies surrounding them:

I felt cared for but it did seem impersonal at times...well they did examine me but I felt they were more interested in what the machines were telling them... I felt just separated from it (Participant 6)

Patients often described how they felt lonely and invisible in the presence of technology:

Even though they were no further away than the corner of the room. I still felt very alone. I couldn't make myself heard. I'd got no strength so I couldn't bang anything. I looked around and thought is this it? Just me? I've never been surrounded by so many people and felt so alone. I've never had so much attention yet felt so neglected.
(Participant 4)

Participants described invisible care, whereby they described caring interventions but did not see them occur. Caring activities were going on around them but not necessarily to them or with them. Participant 8 when recalling the nurses involved in their care described them as being 'kind of faceless...' This lack of memory of human contact and perception of 'faceless' care exemplifies the notion that healthcare practitioner may become an extension of technology. In the participant accounts it appeared that the nurse was so eclipsed by the enormity of technology that they too became invisible.

Being Good

Participants' accounts revealed an unspoken set of rules and standards with which they complied and an underlying acceptance of the technologies imposed. They accepted their situation describing it as 'just one of those things' (Participant 17) and felt they had to 'just get on with it' (Participant 14).

Participants appeared to comply with routines and expectations as they expressed an overwhelming fear of being a burden. They tried not to disturb nurses unnecessarily- often so as not to disturb the perceived enforced routine that is set by the presence of the technology:

I tried to keep still so I wouldn't disturb the lines. They kept alarming, I will never forget the sound of that alarm!.. Anyway, every time it went off somebody would come and re-set it and every time I moved it would go off again... (Participant 19)

Getting Over it

Getting over it revealed *why* participants endured applied technologies.

Bowing to Authority

One important aspect of tolerating technology was the fact that participants felt they had no choice. Participants accepted the authority and judgement of healthcare professionals. Participant 3 described this as 'at their mercy'. Other participants recalled 'giving in to it' (Participant 5) and 'letting them get on with it' (Participant 16), which may suggest a lack of control and capacity to influence their care. However, at the same time participants recognised the expertise and clinical judgement of healthcare professionals:

It's hard to say, because obviously they are the experts and you have to bow to their better judgement... (Participant 17)

Necessary evil

It is apparent that participants endured technologies by recognising the benefits of the applied technologies, frequently regarding them as a 'necessary evil' (Participant 19). In the data there were paradoxical descriptions of technology as being both distressing and unfamiliar as well as providing a sense of comfort and hope. Participants frequently rationalised that the benefits of complying with the treatment outweighed its discomfort. Participant 4 recognised the discomfort of tracheal suctioning however recognised that this invasive procedure actually bought them physical comfort:

Because [tracheal suctioning] ... it feels like you... when you have a frog in your throat and you try to clear it, well I couldn't do that so it was a great relief.
(Participant 4)

As well as the potential of physical comfort, the presence of technology provided the participant with security and optimism for their recovery. Participants felt secure in the presence of technology as they perceived it to be making up the short fall of their dysfunctional body:

It [non-invasive ventilation] was just to increase my oxygen levels because obviously I wasn't breathing quite right. At that point I had more liquid in my lungs again. Because they literally took a litre and half they said... although it was a relief, quite a big relief as it was helping my breathing. (Participant 8)

Throughout their stay on ICU, participants gained knowledge of technologies and used technologies as a means of reassurance that they were on a pathway of recovery. In particular some participants perceived technology to be an integral part of their recovery process.

Technology seemed to represent the recovery trajectory where technologies were applied or removed at various stages of the illness and recovery.

... So as each drip disappeared and they took off the things from my leg I knew it meant that I could do more for myself. (Participant 7)

DISCUSSION

When describing their overall experiences, participants described how they experienced technology and care as inseparable. The inseparability of technology and care not only accorded with Heidegger's notion of ready-to-hand (Heidegger 2010) which suggested technology was so embedded in 'being-in-the-world' that it was used without theorizing but also reflected findings of several key studies that investigated technology and care from the caregivers perspective. Ray, as early as 1987, first described the notion of technological caring, suggesting that technology and care were harmonised in daily nursing practice (Ray 1987). Locsin (2010) and Little (2000) describe the application of technologies in ICU as an expression of caring, whilst Wikström *et al.* (2007) described technologies as an integral tool to a nurses work. It would appear that at least in part, patients agreed with the nurses' view that technology becomes an inseparable component of the totality of the caring process in critical care.

This study also revealed a tension in how participants perceived technology and care as participants distinguished between technological and non-technological aspects of care. Participants frequently described examples of personal acts of care such as providing personal hygiene and emotional support. Participants highlighted these elements of care as being particularly comforting and meaningful. These examples of meaningful care reflected

the Australian Department of Health (2012) description of intelligent kindness where compassionate care is delivered with empathy, respect and dignity. However, despite the presence of intelligent kindness participants described episodes of impersonal care where they felt isolated, invisible and lonely in the presence of technology. Despite being constantly monitored and observed by healthcare professionals, participants described feelings of loneliness. Feeling invisible in ICU has been reflected in other research literature, (Lapum *et al.* 2010, Bergbom & Askwall 2000, Almerud *et al.* 2007). As participant 4 of this study poignantly described, they never felt as though they had so much attention yet felt so neglected.

A key thread that permeated every theme was the inability of patients to make and enact choice. This lack of agency was seemingly attributable to a lack of opportunity and physical and psychosocial incapacity. Participants did not appear to be active players in their care. Feelings of powerlessness, relinquishing one's agency and feelings of absolute dependence described by participants in this study have also been reported in other research literature (Adamson *et al.* 2004, Johansson & Fjellman-Wiklund 2005, Almerud *et al.* 2008). The lack of patient agency in ICU appeared at ideological odds with the key values of modern healthcare which endorse patient-centred care. However, patients themselves have described the positive benefits of surrendering their agency during critical illness. Despite feeling powerless and bowing to the authority of the caregivers, participants in this study expressed that they trusted both the expertise and judgement of healthcare professionals and technologies applied. Similarly, other studies revealed that patients recognise, respect and are reassured by the competence of their carers (Hofhuis *et al.* 2008, Wahlin *et al.* 2009).

Moreover, the unquestioned compliance with technology may also be related to the hope of recovery offered by technology. Participants often rationalised the presence of various technologies in terms of the potential physical recovery it would bring. Participants frequently staged their progress according to the presence or absence of various technologies. Although studying patients having cardiac surgery, Lapum *et al.* (2010) suggested that patients succumb to technology as it represented a 'technological fix' and an expectation of recovery. Furthermore, in recognising the life-saving potential of technologies, participants appeared to endure technologies as a necessary evil. Participants recognised that the long-term benefits of the application of technologies such as endotracheal suction often outweighed the short-term discomfort and encumbrance. Eastwood *et al.* (2009) suggested that patients tolerated interventions if the therapeutic benefit was obvious. Reflecting the participant perceptions in this study, even what were perceived to be invasive and distressing technologies such as mechanical ventilation have been frequently reported as providing comfort and security to patients in ICU (Johnson 2004, Schou & Egerod 2008, Wang *et al.* 2008).

Participants' accounts of technology and care appeared to represent a series of paradoxical relationships. On one hand participants perceived technology and care as inseparable, yet on the other participants distinguished between technological interventions and personal nursing care. Participants described times of impersonal care which made them feel invisible and isolated. Conversely participants described how technology offered comfort, security and hope of survival. Participants viewed technologies as a necessary evil where potential life-saving benefits were reconciled with personal discomfort and encumbrance. Whilst some of the sentiments expressed by participants have been reported elsewhere in the literature the unique finding from this study was the revelation of the paradoxical relationships between

these emotions and experiences. Patients appeared to experience emotions across a broad range of spectra. This demonstrated the complex nature of patients' experiences and emotions and indicated the extensive skill set required by the professionals caring for them. Since patients' experiences of technology have been minimally reported in previous research literature, these findings offered a unique view of patients experiences of being cared for in technological environment such as ICU.

Limitations

This study was a single centre study in the UK. The sample consisted of only white Europeans which, whilst reflective of the local population, may not reflect other regions in the UK and further afield. A multi-site study may have increased the diversity of the study population. The study sample was further restricted as only patients who agreed to attend a follow-up clinic were recruited. Patients who potentially may have made rich contributions to the data, but did not want to attend clinic, may therefore have been inadvertently excluded. From the 90 patients invited to take part, 19 responded. It is not known whether the experiences of those people who did not take part were different from those who chose to take part. The discussion of the findings has demonstrated how the study population's experiences resonated with other published research therefore suggesting the findings may be transferable.

CONCLUSIONS

This study has examined the complexities and multi-dimensional experiences of patients cared for in the technological environment of ICU. Technology is clearly fundamental to treating and caring for the critically ill, however, an increased awareness of how patients perceive technological caring provides patient-based evidence to underpin nursing practice. Phenomenological consideration of patient experiences of technology is based on the premise

that the phenomenon is inseparable from the social, emotional and historical context which means that patient experiences depend on these contexts. This premise places nurses at the heart of the patient experience as they are integral to the ICU context. A challenge to the critical care nurse is the constant presence of technology, the complexity of critical illness and the necessary prioritisation of addressing life-threatening physical problems. This study's findings may enhance nurses' provision of skilled care that considers patients' experiences of technology and the challenges of their sometimes paradoxical experiences to place patients at the centre of their care. In addition, patients' accounts of their care experiences in ICU may demonstrate how core nursing values such as care, compassion, competency, communication, commitment and courage (DoH 2012) might be achieved in practice.

The study highlighted the paradoxical nature of patients' experiences of technology and care: impersonal yet personal, alienating yet reassuring, uncomfortable yet comforting. Nurses, therefore, need to be cognisant of the alienating potential of technology and implement and manage technologies in such a way that not only recognises their capacity to rectify physiological deficit but also emphasizes their potential to provide comfort, reassurance and a hope of survival to patients. Elements of care that patients in this study indicated as comforting and reassuring such as delivering personal care, vigilant assessment, managing technologies competently, were associated with a close and supportive nurse presence. Nurses being alongside as well as beside the patient may minimise the invasive and isolating potential of technology and make care more visible and personal. This level of compassionate care may potentially provide therapeutic benefits that extend beyond maintaining patients' physical needs, by providing emotional and psychological comfort. This reinforces the importance of nurses in ICU balancing care interventions that makes patients actually *feel* better with managing the healthcare technologies essential for their physical recovery.

Critical care educational and preceptorship programmes should therefore not only develop nurses' technological competence but also develop compassion and communication skills where the existential and psychosocial impact of critical care technologies are recognised, appreciated and managed.

In relation to patients' lack of agency, nurses need to recognise that patients may wish to participate in their own care and be involved in decisions about their care where appropriate. Suggested activities, in which patients might initially be encouraged to participate, include hygiene activities, patient positioning, breathing and mobility exercises and decision-making regarding visitors and rest periods. These recommendations complement the NHS strategy of forming cohesive partnerships in care (DoH 2011) and offers pragmatic suggestions as to how this may be reconciled in clinical practice.

Participants in this study frequently described specific stressors often associated with technologies and described factors that provided comfort and reassurance. Therefore further areas of potential research include a deductive exploration clarifying stressors encountered by patients and the factors which provide reassurance, hope and comfort. Such research may assist in the development of strategies of care that serve to minimise stressors and their impact.

Technology, whilst playing a fundamental role in recovery and survival of the critically ill, also contributes to patients' complex and variable experiences in ICU. The presence of technology appears to contribute to the stress endured by patients in ICU whilst simultaneously providing comfort and reassurance. Technology is undoubtedly embedded in

ICU therefore a deeper understanding of patients' perspective, as explored in this study, may help healthcare professionals manage the consequences of technology more effectively.

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Figure 1: Schema of Technology and Care

