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Learning how we learn: an ethnographic study in a neonatal intensive care unit

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Abstract

Title. Learning how we learn: an ethnographic study in a neonatal intensive care unit.

Aim. This paper is a report of a study to identify how nurse clinicians learn with and from each other in the workplace.

Background. Clinicians' everyday practices and interactions with each other have recently been targeted as areas of research, because it is there that quality of care and patient safety are achieved. Orientation of new nurses and doctors into a specialty unit often results in stress.

Method. An ethnographic approach was used, including a 12-month period of fieldwork observations involving participation and in-depth interviews with nurse, doctor and allied health clinicians in their workplace. The data were collected in 2005–2006 in a paediatric teaching hospital in Australia.

Findings. The findings were grouped into four dimensions: orientation of nurses, orientation of medical registrars, preceptoring and decision-making. The orientation of new staff (nursing and medical) is a complex and multi-layered process which accommodates multiple kinds of learning, in addition to formal learning. Workplace learning also can be informal, incidental, interpersonal and interactive. Interactive and interpersonal learning and the transfer of knowledge include codified and tacit knowledge as well as intuitive understandings of 'how we do things here'.

Conclusion. Research into how nurses learn is crucial for illuminating learning that is non-formal and less recognized than more formal kinds. To provide a safe practice environment built on a foundation of knowledge and best practice, there needs to be an allocation of time in the busy workday for learning and reflection.

Keywords: ethnography, neonatal intensive care unit, nursing, workplace learning

Introduction

In many countries, nurse clinicians' work practices are becoming increasingly complex while nurse turnover and diminishing workforces are the reality. Despite learning at work constituting a large part of adult learning (2003) the role of workplace learning in the context of patient safety and quality of care has not received the attention it deserves. The patient safety literature emphasizes the role of effective communication and good teamwork (Vincent 2006, Runciman *et al.* 2007), but no compelling accounts are offered of what these phenomena look like.

Background

Van Der Geest and Finkler (2004) comment on the lack of studies focussing on socio-cultural processes within hospitals, although ethnographic research methods in medical settings have been used for about 50 years (Atkinson & Pugsley 2005, Pope 2005).

Workplace and informal learning theory (Lave & Wenger 1991, Colley *et al.* 2003, Eraut 2004) developed from critical reviews of what education and learning are about. Historically, formal learning referred to a didactic pedagogic style which was highly-structured and institutionally-based (Marsick & Watkins 2001, Colley *et al.* 2003). In contrast, informal learning exhibits greater flexibility of learning in a variety of spaces, e.g. workplace learning, and acts as a complementary partner to learning from experience (Eraut 2004). The expansion of education and learning accompanied the construction of different forms of learning and apprenticeships in institutional settings. Benner's (1984) seminal work on how nurses learn through a continuum of novice to expert is apt in this context.

Orientation of new staff to a ward is orientation into a community of practices (Lave & Wenger 1991, Boud & Middleton 2003). Long-term workers develop their practices through stages of learning (experiential learning), thus adding two further dimensions to consider – those of time and space (Solomon *et al.* 2006). Bleakley's (2006) dynamicist model of learning emphasizes the fluidity of clinical teams, i.e. workers may or may not be the same, but teams operate through time and space.

In the nursing workplace, there are intersections of formal learning (seminars, lectures), informal learning (mentoring) and preceptoring (partially structured). Informal learning is interactive and interpersonal and the transfer of knowledge is one-to-one and 'local' (Koopmans *et al.* 2006). Marsick and Watkins (2001) claim that informal learning may also be incidental learning, i.e. learning takes place although people are not always conscious of it.

Neonatal intensive care units

It is well-documented that in the complex subculture of a neonatal intensive care unit (NICU) there is a clear primary task for staff of survival (Premji & Chapman 1997, Paul 2000, Carter 2006). This subculture encompasses beliefs, norms, attitudes and assumptions learned over time and shared by unit staff. These are usually manifested subconsciously and described as 'the way we do our work here' (Ohlinger *et al.* 2003, p. 471).

Staff within the NICU have been described as a community of souls who come from different beginnings and orientations (Paul 2000). The way in which nursing activities are organized depends on their level of expertise (Ewing *et al.* 2003), and not all function at the expert level. Highly experienced NICU nurses are found to opt for routine nursing practices to protect themselves from the risks associated with 'individualized' clinical decisions (Greenwood *et al.* 2000). In addition, the relationship between nurses and doctors is of major importance, especially when life and death decisions have to be made (Paul 2000). One aspect of caring for infants over a period of time is the valuable contribution to decision-making made by nurses. In getting to know the infants, nurses espouse different opinions from doctors (Spence 2000).

Neonatal intensive care unit work is complex and the environment is one where everybody's actions are monitored. Staff work closely together and the work and roles are interrelated. There is open availability of observations and recordings of the infant's progress. Paul (2000) describes how sometimes it feels as if someone is looking over the nurse's shoulder continuously and doctors are constantly watched.

Over past decades knowledge of the medical and physiological needs of sick infants has increased. Working in an NICU requires staff to handle large volumes and different types of information when they make clinical decisions (Ewing *et al.* 2003). Different groups of staff conceptualize knowledge in different ways, and this affects the differences between clinicians in decision-making. Blurring of professional boundaries may influence how decisions are made and the outcomes that follow (Ewing *et al.* 2003). Junior doctors manifest a lack of knowledge in the highly specialized NICU, and this is indicative of the short time they spend there during the clinical rotations of their training.

Team collaboration between doctors and nurses with a clear purpose represent the essence of why people do their work and helps guide decision-making (Ohlinger *et al.* 2003). When nurses who have cared for infants with multiple problems over a period of time disagree with long-term care decisions, this is based on their awareness of infants' responses to interventions.

Learning about the complex, dynamic matters in an NICU occurs in many ways. Premji and Chapman (1997) found that, even after the conclusion of a structured educational programme, nurses continued to learn from others in the unit. They sought the guidance of those whom they considered were more competent, and sourced appropriate resources to support their attempts to learn.

The study

Aim

The aim of the study was to identify how nurse clinicians learn with and from each other in the workplace.

Design

An ethnographic study was conducted in Australia, with fieldwork data being collected over 12 months between 2005 and 2006. Observations, the immersing participation of the researcher and detailed descriptive fieldnotes of every aspect of clinicians' daily rounds in a unit context were collected. The context was a 20-bed NICU catering for infants with cardiac and surgical anomalies and complex medical conditions. Digital recordings of ward work between clinicians at the crib-side and recorded interviews with key informants from the different levels of nurse clinicians represented in the NICU were collected.

Participants

The participants were 32 nurse clinicians, 14 medical registrars, five allied health workers, a nurse educator, a clinical nurse consultant, a nurse manager, five senior medical specialists and one administrative worker, i.e. 57% of the unit population, constituting a mix of informants.

Data collection

The researcher (CH) observed unit activities at meetings, in the wards during the three shifts over a 24-h period, in ancillary unit rooms, the tea room, corridors and staff offices and gathered observational and digital recordings of the interactions of everyday practices of clinicians at work. Observational methods are considered the gold standard of qualitative methods, because they provide direct access to what people do, as well as what they say they do (Green & Thorogood 2004).

Eight in-depth interviews were conducted with key informant nurses of different skills levels, e.g. Registered Nurses, experienced clinical nurses (ECN), clinical coordinators, team leaders and the nurse manager. Participants guided the conversations and they discussed their tasks and learning experiences at work, including the orientation of new nurses and medical registrars. These data and the transcriptions and feedback sessions with the nurse clinicians elicited the informal learning taking place and self-reflective data.

Ethical considerations

University and hospital ethics committees approved the study. Recruitment was on a voluntary basis and participants were reassured of anonymity. Two signed consent forms were used for the project: one for the project participation and one for consent to audio recording.

Data analysis

An inductive approach to analysis, a hallmark of qualitative research, was used (Janesick 2000). Initially, the task was to find concepts to make sense of what was going on. Transcribed interview data were analysed using keywords to identify topics and themes. All the data were entered into The ETHNOGRAPH version 5.0 program. This facilitated data organization and retrieval, and the identification of keywords, topics, themes and patterns.

Findings

Four dimensions of workplace learning were found: orientation of nurses, orientation of medical registrars, preceptoring and decision-making.

Dimension 1: orientation of nurses or 'learning to do things the way we do things here'

New nurses are recruited into the NICU and undertake an orientation programme with a more experienced nurse. This begins in the high dependency ward (HD), where new recruits learn the ethos of the unit – the 'how things are performed' of the unit. Initially they do not handle the most complex infants or experience the most highly technological intensive care (IC) nursing (cf. Ewing *et al.* 2003, Ohlinger *et al.* 2003). Infants in HD are moved from the IC ward as they recover and are moving towards discharge. Nurses rotate to the IC ward after they become competent in HD, and their orientation begins again in this new setting. Nurse orientation to the NICU occurs on a monthly basis and varies according to the prior experience of each new nurse.

Nurses are never alone when caring for their allocated infant in the NICU's busy environment. Many tasks require several nurses and a cluster of staff around an infant's crib is a common sight. Less experienced nurses call on their more experienced peers for advice, and nursing teams collaborate to perform difficult tasks, such as changing a tracheostomy tube, reloading drug infusion pumps or calculating drug doses.

A Registered Nurse (RN) who had worked in the unit for 6–8 months described it as an intense learning environment, and said that she had a good buddy relationship until this suddenly stopped:

RN: Yeah, even so (buddying had stopped), people are happy to help if you ask for it. So, that's great. Yes…we are expected to help (Newer RNs coming on) and I wouldn't think of being anything else and I hope I am empathetic…It's good for me to have another senior nurse up the HD end…that's extra support for me too, I feel.

This RN felt overwhelmed with the amount of knowledge to learn but she emphasized that there were people who will help you if you ask. Peers and an ECN in HD supported her in her workplace learning. In turn, she supported new RNs in their orientation period.

In HD, there are opportunities for interaction with parents, as they are around more often for longer periods of time as they bond with their infants. If they are first-time parents learning how to care for their babies, nurses teach them safe care and handling practices. There is more opportunity for social interaction between nurses and their peers in HD, as the work is less intense than in the IC ward.

One senior ECN had this to say:

I think the nurses who come into this unit get hospital orientation and unit orientation. They have a nurse who will support them for quite a period of time to teach them how to do things, the way we do things, the culture of the hospital, and obviously individual nurses pick up skills differently from others.

In the buddy system, new nurses are paired with another nurse for their patient assignment. If questions arise about a particular task or observation somebody is there to help. Role modelling occurs over time, when nurses who are adept at implementing specific interventions or care practices support those unaccustomed to the practices by being role models (Premji & Chapman 1997).

Dimension 2: orientation of medical registrars through nurses' eyes

Medical registrars undertake a rotation through the NICU as part of their paediatric training, with four to five registrars being orientated every 4–6 months. There was a great deal of 'talk' about registrar orientation. Whenever the topic was broached during fieldwork, groans and 'ugh' sounds erupted from the nurse clinicians present. One ECN said, 'We loathe change of term'.

Another said:

The registrars who come into this unit, they get a hospital orientation. To my understanding, they don't get very much in the way of medical orientation into the way we do things here…I think they are placed in a very difficult situation…and I feel for them and I certainly try and help and support them in that case. We get registrars who have varying degrees of skill and unfortunately we don't find that out until after you work with them.

A third ECN agreed that the teaching of procedures and 'how we do things here' became the responsibility of nurse clinicians, adding that each NICU has different 'ways of doing things'.

The first weeks of orientation are regarded as a stressful time for the NICU, particularly for the senior nurse clinicians, because while registrars learn, the responsibility for the smooth continuity of patients' care largely falls on them. The ECNs' view that the medical orientation of registrars is 'on the job' or workplace learning was supported by senior neonatologists:

It's the ultimate on-the-job training…and it works generally because they (registrars and medical students) grow up in that medical context…people expect that's the way it is…

The learning models of nurses and registrars are conceptually different.

One ECN interviewed often acted as shift manager and recognized the significance of building teamwork during the orientation of registrars when she said:

ECN: Doctors on the whole don't recognize nurses…The skills and knowledge and the assistance, and how they can work together with those nurses…

Researcher: So they are not reaching out to experienced nurses?

ECN: Not initially…If they are willing to work with me and take my guidance, then we work fabulously well as a team. It's only the very few who don't recognize that this person is here to be synergistic with me so we give the best care for this baby. Some senior nurses in the unit…are a little bit less mindful to some of the registrars, and there can be some pretty tacky incidences and some of the registrars can feel pretty unsupported.

Some neonatologists reported that during orientation there are instances when individual registrars are given advice on how to interact socially with the nurses to learn to work together:

Researcher: Would you say you have instances where you either have registrars coming to you with problems with dealing with nurses or vice versa?

ECN: All the time…We are both there for the same job – to give the best care for that patient. My expectation is that they will talk with me and hear my concerns…I try and discuss the issues with the nurses and see where the registrars are coming from, and maybe suggest modes of addressing the issues with the registrars – maybe you can try this, you can maybe be patient, just give them some time.

The first weeks of orientation are 'learning times' for nurses and registrars to build teams that achieve optimum levels of teamwork. In these first weeks, the normal clinician hierarchy is reversed while registrars learn the 'ways of doing things here'. The ECN, in her role as shift manager, astutely recognized and was continually mindful of her need to assess the medical and social skills, characteristics and idiosyncrasies of each new registrar. This is a powerful and significant form of informal workplace learning, in contrast to formal workplace learning where she or other ECNs instruct registrars in ventilation techniques. Informal workplace learning is often invisible., and in this case, it was part of the invisible labour shared by ECNs and based on their tacit knowledge and experience (Eraut 2004).

Dimension 3: preceptoring – moving up the ladder

Once RNs demonstrate competence caring for the infant and family within the HD environment they are allocated a preceptor, an ECN with whom they are coupled to accomplish the standard list of 'hands on' tasks during their transition to the NICU environment.

Preceptoring is workplace learning of a formal type; it requires the accomplishment of specific tasks and takes place in both the IC and HD wards, often at the crib-side. The time is at the discretion of senior nurse clinicians and takes place during the preceptee's normal shift roster. It may be tailored to the workload of other shift nurses. The programme is conducted over a number of weeks and is defined as interpersonal or interactive learning (Koopmans *et al.* 2006) because it is enacted between the same two individuals throughout. The training time varies according to skill status and the different pace of learning of each preceptee. It is a one-to-one transfer of knowledge between a senior ECN and a trainee. For example, learning how to suction an endo-tracheal tube is a required accomplishment of IC nurses. Here is an extract from a preceptoring session on suctioning which took place during the research observation and recording:

Preceptee: OK, we'll use some saline.

Preceptor: We will?

Preceptee: Yep. So if you do use it, you need 0·1 mL/kilo

Preceptor: 0·1 mL?

Preceptor: What we are looking for (that indicates a need for suction)…if you've got an elevated $TcCO_2$ whether the tidal volumes have changed. They (tidal volumes) are sitting at about 10 mL, which is where we were before, whether there's any increase work of breathing as well. These might suggest there's a clinical obstruction…OK, so we need to disconnect, instill the saline down the endotracheal tube first, and then we will reconnect so the baby gets a couple of breaths and disconnect again and pass (insert) the catheter.

Incidental learning, where learning has been taken for granted, is tacit or unconscious, occurred as the researcher participated in the following exchange during another preceptoring episode at the crib-side:

Researcher: I wanted to know, (name of preceptor), why nursing this baby is not conventional? What do you mean by that? Does that make it harder?

Preceptor: Yes, it's difficult for (name of preceptee) in that (name of doctor) issued a very specific instruction which is not usually how we do things, and so in learning to (pause) the desire is to follow the medical officer's instructions. However, everything else she previously learnt contradicts the consultant's orders and, more importantly, the baby doesn't seem to be tolerating this. So it's how to negotiate that.

Researcher: OK, is this more difficult than some of the others or is this just another one that you have to deal with?

Preceptor: It's more difficult for me today because I am working with (name of preceptee) – she's got 4 more days left before she becomes an independent practitioner in IC, so it's difficult for her to feel comfortable in an environment when someone moves the goal posts. So that's frustrating for me, I s'pose. And frustrating on a clinical level because I can see that the baby isn't responding to the prescribed therapy and I'm cautious too, as an individual, so I wouldn't be as aggressive – well, not aggressive – but (pause) forceful. I'm cautious in my planning.

In this example, the complexities of learning were intensified for both preceptor and preceptee because the prescribed treatment was in contradiction of what the preceptee had previously learnt. The preceptor's reputation as an imparter of learned knowledge was (potentially) sullied by the unexpected directive of the medical specialist. The preceptor had only 4 days left before the preceptee was seen as a competent IC nurse and the crux of the event was not the directive but the infant's non-responsiveness to the treatment prescribed. As carers, the preceptoring team had to act on this development. Thus, prescribed non-routine treatments by senior staff have varying degrees of effect on patients and their nurse carers.

Dimension 4: decision-making

In the above context, the preceptoring team proceeded in terms of quality and safety of care and practice for the patient. They engaged in 'on the spot' and 'on the job' critical thinking and decision-making. They stopped the treatment and simultaneously enlisted the assistance of the registrar to advocate and legitimize their revised plan of treatment:

Preceptee: It's hard to document when you are trying to explain why you are not doing what the doctor said. We have tried to do it with saline and it didn't work and the baby didn't handle it well, so we spoke to (name of registrar) and (name of registrar) agrees with me…they give you the answer you want and then you're happy with that, and sometimes they say they'll talk to the consultant (neonatologist) and get back to you

Preceptor: It's the path of least resistance, isn't it? You ask (name of neonatologist) and he'll say, 'I don't care' or he'll tell me to do that and I don't want to (exasperated laugh)…So I go to ask (name of registrar) because (name of registrar) and I can steer down a path and he'll listen to what I say, whereas (name of neonatologist)…

Medical notes are written up to ensure appropriate accountability; this is another learning task:

Preceptee: Is that all right? (Showing preceptor the computer notes)

Preceptor: I think so. It says what we've performed and it's factual. It describes that we tried to follow the orders as per (Medical officer), it describes how (name of baby) responded to that, it describes how we negotiated it with (name of registrar) and what our plan is from now. I think that's reasonable.

Whose best interest and accountability for what and for whom are at the forefront of the decision-making (cf. Spence 2000). The infant's best interest takes priority over the prescribed treatment. This example demonstrates a hierarchy of command from the clinical nurses to the registrar, and beyond to the staff specialist. The power differentials are stacked according to best quality of care and those who know the infant best – the clinical nurses.

The preceptor's experience and tacit knowledge was highlighted in this next excerpt, where she explained the nursing care ethos:

At the end of the day, the goal of care should be common, so that those prescribing the treatment and those delivering the treatment should be able to come to commonality about what the goal is and how it's best achieved. You still exist in a system where instructions and orders are followed, and I appreciate expertise and knowledge, all of those sorts of things, and possibly the legality behind that.

This kind of knowledge is used to generate hypotheses or possible sources of action (as evidenced by the preceptor seeking the registrar's acquiescence in the treatment path), demonstrating that knowledge and experience are acquired through many kinds of learning. The preceptor is not transferring knowledge but deliberately uses her intuitive understanding, reflection and analysis to articulate values and 'the spirit' or ethos of nursing care in the NICU. Simultaneously, she reinforces her teaching skills, and draws on her wealth of nursing experience. These are moments of reflexivity for her personally, and for others who are assessing her abilities as a leader of future nurses.

Discussion

Study limitations

One limitation of the study was the research perspective, which was that of nurse clinicians. The staff specialists and the registrars also have strong and equally valid perspectives on orientation and workplace learning, and these should be the focus of further study.

In this paper, we describe examples of everyday workplace learning in a NICU, in which the work is complex. It is an environment where everybody's actions are monitored, where staff work closely together and the work and roles are often interrelated. There is open availability of observations and recordings made of the infant's progress (Paul 2000), and this was described as a looking over the shoulder feeling nurses sometimes have.

Normal nursing practice in any NICU begins with orientation. Orientation programmes are constructed to inform new comers of 'how we do things here'. Some of this orientation involves transmitting codified knowledge in textual materials such as an orientation manual. The orientation of RNs from novice to expert involves formal and informal learning, arguably all learnt at work. In contrast, registrars' orientation is largely 'learning on the job' and requires (from senior nurse clinicians) a trade-off of higher medical education qualifications for the learning of pragmatic patient safety and quality of care tasks learnt at the crib-side. This increases nurses' responsibility to ensure that registrars practise safely.

Preceptoring is an intense training and learning time for both nurses. The transfer of knowledge is a heavy responsibility taken seriously by all ambitious and skilled nurse clinicians. Some nurses have commented on the clique-iness that develops between certain pairings: some display better synergy than others, some have more ability to reflect on

What is already known about this topic

- Specialty clinical staff are handling increasingly large volumes and different types of information necessary for quality of care and patient safety.
- Orientation of new nurses and doctors into a specialty unit often results in stress.
- Neonatal intensive care work relies on team collaboration among nurses, doctors and allied health professionals.

What this paper adds

- An analysis of workplace learning is useful in defining the kinds of work nurses do and how and where they learn and upskill their practices.
- Orientation of new staff is a multilayered and complex process that requires all staff involved to accommodate varying skill levels, learning styles and personality traits in an ever-changing clinical environment.
- To provide a safe practice environment built on a foundation of knowledge and best practice, managers need to ensure that time is allocated in the busy workday for learning and reflection.

their practices and others learn if given the opportunity. As well as 'learning to do things the way we do things here', nurses are encouraged to choose a mentor or they are allocated a buddy or preceptor (Gunderson & Kenner 1988, Premji & Chapman 1997). Buddying, preceptoring and mentoring are forms of informal workplace learning (Marsick & Watkins 2001).

Other kinds of learning are embedded in workplace practices. Informal and incidental learning are often the result of a significant unexpected event according to Carter (1995) and Menard (1993). Tacit knowledge and intuitive understanding accumulate with experience over time and cannot be imparted to junior staff as a skill. Eraut's (2004) view is that tacit knowledge is personal and intuitive, based on an invisible form of learning embedded in nursing practice. Intuitive understanding derives from a cumulative aggregation in memory of perceptions of many previous episodes. These dispositions are dependent on personal attributes and repertoires.

Issues which arise during orientation are common across NICUs. In one study, researchers found that all nurses encountered conflict with other healthcare professionals, especially doctors in training, in trying to practise an individualized model of care (Premji & Chapman 1997). This difference of opinion is the result of levels of expertise in the NICU, and is not necessarily associated with specific roles. The probability of the orientation proceeding without hitches, excluding the issues around personalities and group dynamics, rests with the qualities, abilities and strengths of the senior nurses and medical specialists. In registrars' orientation in particular, nurses struggle with those who do not adhere to or do not understand the specific model of care which is practised in the NICU (Premji & Chapman 1997). Hall and Weaver's (2001) research with medical registrars apprenticed to experienced nurses showed that the apprenticeships led to registrars gaining a better understanding of nurses' work and better communication. Nurse orientation relies on 'in the ward' education. Nurses do better if there is a smooth transition from having individual support to being on their own with peer support: 'help is there if you ask for it'. This statement resonates with the ideas of Premji and Chapman (1997) about nurses' ability to learn continuously from others and through role modeling. Nevertheless, there are nurses who do not see any connection with what they do (tasks) and learning. They come to work, perform their tasks and go home. This kind of thinking fits the more traditional model of worker (Boud & Solomon 2003), in contrast to modern workplace learning models demonstrated in this study (Premji & Chapman 1997, Boud & Middleton 2003, Koopmans *et al.* 2006).

From an educational perspective this study offers insight into bedside clinical teaching, which is advantageous because it is reality-based. It occurs in a constantly-changing environment facilitating critical thinking and decision-making, and affords experienced clinicians the opportunity to share the art and science of neonatal nursing. Conversely, the transfer of knowledge and multiple tasks occurs in a busy and noisy environment. The process is interrupted by other conversations or other infants' clinical needs. The transcripts indicated there is an assumed level of knowledge and familiarity with the clinical environment which ensures that despite the interruptions the preceptee is able to embrace the concepts being discussed and demonstrated.

Conclusion

Research that focuses on how clinicians learn, perceive quality of improvement health care, patient safety and clinical communication is an investment in the future of the critical care environment and neonatal nursing. Ethnographic research that focuses on clinicians' interactions with each other in their everyday work practices is instructive in a number of ways. It gives researchers and clinicians the

opportunity to examine closely the social and interactive contexts of how learning occurs; the content of learning, the transfer of knowledge and what constitutes good practice. These elements are visible through social and informal learning contexts as well as clinical and medical. To provide a safe practice environment built on a foundation of knowledge and best practice, time needs to be allocated in the busy workday for learning and reflection. Healthcare managers have a responsibility to ensure the availability of adequate resources to achieve this goal through workplace learning.

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Author contributions

CH & KS were responsible for the study conception and design. CH performed the data collection. CH performed the data analysis. CH, KS & KM were responsible for the drafting of the manuscript.KS, RI, CH & KM made critical revisions to the paper for important intellectual content. RI obtained funding. RI supervised the study.

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