Coming ready or not' high fidelity human patient simulation in child and adolescent psychiatric nursing education: Diffusion of Innovation

Abstract

This paper is the first to address high fidelity human patient simulation (HFHPS) as a technique to prepare pre-registration nursing students for practice in child and adolescent psychiatric nursing (CAPN). By examining the published literature in a systematic review, no evidence was located that discussed the application of this innovative mannequin-based educational technique for this population. Indeed, mental health nursing preparation generally had minimal literature addressing adoption of HFHPS.

Rogers' (2003) model of the "Diffusion of Innovation' was applied as a lens to explain this observation. His model fitted this observed pattern well and provided a range of explanatory paradigms. It was limited, however, in its predictive ability to suggest when and under what conditions HFHPS might be expected to be adopted by nursing preparation programmes for CAPN.

At the conclusion to this examination, the absence of a conversation evident in the mental health or CAPN literature on the preparation of pre-registration nursing students using this educational technique is striking. The potential of this approach to be combined in new ways to better prepare nursing students for the challenges of practice in mental health or CAPN needs extensive examination.

Introduction

The international adoption of high fidelity human patient simulation (HFHPS) by pre-registration nursing education providers has evolved in a manner consistent with that described in the model of the 'Diffusion of Innovation' developed by Rogers (2003). This process of communication of new ideas is also discernable in mental health nursing pre-registration preparation, though at an earlier stage. Published evidence of adoption in the education of CAPN however, is non-existent.

This paper will outline the salient features of Rogers' (2003) model and through this lens provide a descriptive account of the process of adoption of high HFHPS by pre-registration nursing education providers. Understanding is afforded through the lens of this model for the differences in uptake in both mental health and CAPN from other areas of pre-registration nursing preparation.

The paper concludes with speculation regarding the future ways that HFHPS might be adapted to fit pre-registration nursing preparation in CAPN.

Mental Health Applications of HFHPS: The Literature

A search for literature using Scopus was undertaken in order to ascertain the extent of adoption of HFHPS in both mental health nursing and in CAPN preparation programmes. 'Simulation and nursing' as search terms resulted in 1,421 matches on this data base. 'Simulation and mental health nursing' reduced matches to 57 papers, and simulation and psychiatric nursing had only 32 articles. Combining the terms high fidelity simulation and mental health nursing identified three relevant sources. High fidelity simulation and psychiatric nursing resulted in only a single paper. Simulation and child and adolescent mental health nursing had no matches identified in the literature accessed via the Scopus data base and simulation and child and adolescent psychiatric nursing had nil. Likewise, high fidelity simulation and child and adolescent mental health nursing or child and adolescent psychiatric nursing had no sources matched. Searching Medline, Proquest and Cinahl (Point of Care-Nursing Adviser) databases with the same terms yielded no further references.

Investigation of other sources of references included conference proceedings, reference listings from the International Nursing Association for Clinical Simulation and Learning, Society for Simulation in Healthcare and references from other non peer reviewed sources, policy documents and opinion pieces. A 'pearl growing strategy' (Harter, 1986), that is, examining the reference

lists of identified sources from data base searches, was also employed. This resulted in saturation being reached as the same sources were repeatedly encountered.

At this point, the data search was concluded. Only two papers were identified that explored pre-registration mental health nursing preparation using HFHPS. There was no published literature identified that explored the application of this innovative educational approach in the context of CAPN.

This systematic examination of the published literature addressing the adoption of HFHPS in either mental health or CAPN pre-registration preparation programmes confirms the contention of this paper. There is a marked difference in the use and up-take of this innovative technology in comparison to other fields of nursing practice. Rogers' (2003) model of 'The Diffusion of Innovation' was employed to explain this difference as it is widely accepted and used within the nursing and general education literature to critique programs and educational innovation. For example Starkweather & Kardong-Edgren (2008) examine the use of this model to assist uptake of HFHPS in an undergraduate nursing programme, Tung and Chang (2008) examine diffusion of online education using Rogers (2003) model and as do Žvanut et al.(2010).

Rogers Model and Diffusion of Innovation

1. Background

To understand the process of adoption of HFHPS, diffusion of innovations models have utility. These models have developed in diverse areas of scholarly research such as communications (Rogers & Kincaid, 1981) , health services delivery (Green & Johnson, 1996; Greenhalgh et al., 2005), sociology (Coleman et al., 1966), economics and business studies(Bass, 1969). Rogers' (2003) 'Elements of Diffusion' has been identified as an appropriate model to examine the adoption of HFHPS in CAPN. This model was chosen as Rogers[1] (2003) is recognised as the seminal author in this field from whose pioneering work, other models were adopted and derived (Valente, 1993).

2. Model Details

Rogers (2003) founded his model on empirical studies that revealed repetitive patterns in the adoption of innovation (Bailey, 1957; Valente, 1993). The patterns he identified were exhibited in the behaviour of individuals in social systems that were closed to uncontrolled external interaction. The patterns were discerned over the passage of time.

> *"A system has structure, defined as the patterned arrangements of the units in a system, which gives stability*

[1] Rogers (2003) is the 5th edition, originally published in 1962.

and regularity to individual behavior in a system. The social and communication structure of a system facilitates or impedes the diffusion of innovations in the system."(Rogers, 2003 p37).

In this discussion, education systems are examples of social systems such as those described by Rogers' (2003) model. They are comprised of interrelated units (subject specialties), engaged in joint problem solving (achieving safe standardised clinical skill development) to achieve the common goal of preparing nurses for practice. Interaction with external influences in education providers such as universities is controlled and moderated by policy and procedure. As such, they meet some of the descriptors of closed system organisations explored in Systems Theory (Sampson & Marthas, 1990; Shortell & Kaluzny, 1997)

3. Rate of Adoption of Innovation

Rogers (2003) contended that rate of adoption of the new idea (or innovation) conforms to an 's-curve' in the cumulative rate of adoption over time. This predictable pattern represents slow initial adoption, followed by increased implementation in subsequent time intervals that reflects larger parts of the closed social system embracing the new idea. Then follows a deceleration as the bulk of adoptees have already embraced the innovation and finishes with a

low rate of adoption as the final participants join the implementation of the innovation.

4. Applications

This description fits observed growth patterns evident across many fields in social services and health (Ferlie et al., 2001; Grimshaw et al., 2004; Lomas, 1997). However, it does not hold if the social system is not closed, and the affected population changes rapidly. Adoption rates become diluted and therefore, will not conform to this classical ‘s-curve’ of diffusion of innovation(Green & Johnson, 1996).

If the value of the innovation or new idea is not apparent to the affected population, this will also impact the pattern of its diffusion. Innovations that lose their initial inherent value to the population in question, perhaps because another innovation supplants them, will fail to continue to be diffused in the same way (Green & Johnson, 1996).

Application of Rogers’ (2003) Model to Nursing

As HFHPS has existed in increasingly sophisticated forms since the 1970s in fields other than nursing (Bradley, 2006), HFHPS may initially appear to not meet the definition of innovation or new idea. But HFHPS did represent a new technology to pre-registration nursing preparation when adoption began in the late 1990s (Harder,

2009; McCausland et al., 2004). Technological advances and more affordable pricing made HFHPS available to this market at this time - effectively making it a new idea (Curtin & Dupuis, 2008). HFHPS, in this manner, meets Rogers' (2003) requirements for innovation.

For mental health nursing preparation, the increased interactivity of HFHPS is pertinent to its adoption. This includes the associated verbal functions and physiological parameters, like sweating and pupil dilation, relevant to this realm of nursing. This technology is beginning to become positioned as an innovation worthy of more serious consideration for adoption in mental health nursing preparation.

As yet, the applicability for CAPN is less readily apparent. The capacity to simulate familial interaction patterns is under-developed but has potential. However as the contemporary literature places the mannequin as only one aspect of simulation and the concurrent use of actors can compensate for this, HFHPS may yet emerge as a technique of interest.

The simulation of different family structures is limited as currently models of HFHPS are adult, six year old child and baby HFHPS mannequins. However, one might anticipate that additional

age representations in mannequins will emerge allowing increased versatility in family representations.

Rogers' (2003) model recognises that groups adopting an innovation are not homogenous and that there may be sub-groups within a population affected by change. These sub-groups may exhibit differing rates of adoption of particular innovations. However, when the innovation is adopted, their individual up-take then conforms to the s-curve of adoption. The population as a whole then has an s-curve that is the reflection of the culmination of the adoption rates of all these sub-populations.

This aspect of Rogers'(2003) model is evident in nursing's uptake of HFHPS. Mental health nursing and CAPN represent sub-populations of nursing with their independent rates of uptake of HFHPS.

The shortcomings of Rogers' (2003) classical model of the Diffusion of Innovation rests with its descriptive nature. As with all behavioural models, it is short on power of prediction. The rate of adoption of an innovation can be described but the particular timing of the adoption by an individual or sub-population cannot be predicted.

Rogers' (2003) Five Necessary Attributes of Innovation

Rogers' (2003) model describes five necessary attributes to facilitate adoption or diffusion of innovation. These are 'relative advantage', 'compatibility', 'complexity', 'trialability' and 'observability' and can be discerned in the pattern of adoption of HFHPS in nursing. These are supported by a further attribute: 're-invention'. This is the capacity of an innovation to be tailored or adapted to a particular context. These attributes determining the observed pattern of the adoption of the innovation of HFHPS in pre-registration nursing programmes will now be now explored.

a. Relative Advantage of HFHPS

HFHPS partially addresses the scarcity of clinical placements and difficulty in ensuring a reliable and standardised range of experiences for students (Leighton, 2007; National Council of State Boards of Nursing Inc (NCSBN), 2009; Nursing and Midwifery Council (UK), 2010). This establishes a relative advantage for this innovation that is a necessary attribute according to Rogers' (2003) model. This attribute applies to all fields of nursing including CAPN.

b. Compatibility of HFHPS

The technology of HFHPS is compatible with elements from clinical practice. The incorporation of supportive technology (online

patient observation screens, for example), roles taken by participants, procedures supported in using HFHPS and the practice of total immersion simulation, where the environment replicates a clinical environment, are all examples of the compatibility required by Rogers' (2003) model. This feature increases the rate of acceptance of innovation by individuals. However, it is problematic in CAPN as the technological nature of HFHPS is rarely compatible in this manner with this field of nursing practice. This may be a partial explanation of the belatedness of adoption of HFHPS in CAPN.

c. Complexity of HFHPS

Rogers' (2003) model recognises complexity as an attribute of innovations that can significantly affect acceptance. Excessive complexity limits an innovation's adoption. Although there is significant complexity in adopting HFHPS due to demand for curriculum adjustment (Moule et al., 2008; Tuoriniemi & Schott-Baer, 2008; Wilford & Doyle, 2006), staff training (Bray et al., 2009; McCausland et al., 2004; Rothgeb, 2008), and allocation of significant amounts of faculty resources (Akhtar-Danesh et al., 2009; Jones & Hegge, 2008; Rothgeb, 2008), some of the complexity is argued to be synergetic with the health care environment (Issenberg et al., 2005; Nehring & Lashley, 2004; Nehring & Lashley, 2009; Rothgeb, 2008; Tuoriniemi & Schott-Baer, 2008). HFHPS is augmented readily by the technological paraphernalia of acute medical surgical nursing. The equipment

commonly used in such practice environments; electronic monitoring for example, interacts readily with HFHPS mannequins that are best positioned in a bed. However, this is not true in the same manner in CAPN. HFHPS do not easily adapt to domestic or other noninstitutional environments. This is another partial explanation for the failure of HFHPS to be adopted.

Although complexity is regarded as problematic by Rogers' (2003) model for the success of diffusion of HFHPS, it has not stymied the adoption of HFHPS in nursing education. Computerised patient monitoring, programmable applications and online documentation characteristic of HFHPS has increasing parallels in current health care and nursing models (Rothgeb, 2008; Tuoriniemi & Schott-Baer, 2008). These are points of significant synergy. Consequently the complexity is mitigated, but not so in CAPN.

d. Trialability of HFHPS

Trialability, as envisioned by Rogers' (2003) paradigm, poses challenges to the diffusion of this innovative approach to nursing clinical education. The ability to experiment with the application of HFHPS to the curriculum is extremely limited. Despite the relative reduction in cost recently, absolute resource demand for HFHPS is high and of concern. Multiple HFHPS mannequins are frequently required to meet student demand, and although each unit costs

roughly $US27000, the expense easily reaches $US60000 each with additional accessories and programs.

Although this observed situation impacts negatively on trialability, the experience of 'early adopters' within nursing has helped to overcome this difficulty by approximating the ability to experiment. Their experiences have been used by others contemplating adopting HFHPS as a form of trialability. Providers of pre-registration nursing education have also observed the experience of medical education as a source of trialability (Issenberg et al., 2005). But, once again, this has limited applicability to the experience of CAPN as there is no medical literature in this area (Brindley et al., 2008).

Experience with lower fidelity simulators – part task trainers and role plays for example, also offer trialability relevant to HFHPS (Bhoopathi & Sheoran, 2006). This includes curriculum challenge, timetabling tests, assessment and evaluation approaches. (Jansen et al., 2009; Jarzemsky & McGrath, 2008)

e. Observability of HFHPS

HFHPS is a readily observable innovation to the nurse education community, thus addressing the last of Rogers'(2003) attributes of an innovation that affect its adoption. The capacity for

separate education providers to assess elements of HFHPS by observing other provider's experiences is easily achieved (Flanagan et al., 2007). Indeed, there is a degree of collegiality that is evidenced and experienced in workshops and conference documentation established to openly discuss the challenges of adopting HFHPS (such as International Meeting on Simulation in Healthcare, which was held in Phoenix January 23-27, 2010., and associations (such as the Society for Simulation in Healthcare). In this manner, nursing adoption of the innovation of HFHPS also conforms to Rogers' (2003) model. However, there are no discernable proponents of adoption of HFHPS to CAPN acting as a source of observable adoption of this innovation.

Re-invention and HFHPS

The final component that Rogers (2003) suggested as a related concept of innovation is re-invention – the degree to which an innovation is able to be changed or modified during adoption by a user. Inability to use an innovation in any but a proscribed manner would limit the proclivity to adopt particular innovations. HFHPS caters to re-invention in a number of domains. Scenarios can be standard or tailored to particular desires. The mannequin can be altered by the application of various moulage – wounds, trauma, bodily fluids, appearance etc (Foot et al., 2008; Seckman & Ahearn, 2010). Although limited in range, significant re-invention

may thus be achieved. But, in application to CAPN, this feature is much more limited. As communication and group interaction is not as readily simulated with HFHPS as in other methods of simulation, the re-invention of HFHPS by CAPN might fall short. This could affect its adoption.

The Current Status of Clinical Practice Placements

Many western societies, including the United Kingdom (UK), United States of America (USA) and Australia, have struggled to ensure sufficient nursing clinical practice placement positions of adequate quality and quantity (Brown, 2008; Butler et al., 2009; National Council of State Boards of Nursing Inc (NCSBN), 2009). As a result of significant shifts in the mix of mental health services available, notably a shift from hospital or inpatient based services to community models, a reduction in the readily available numbers of clinical placements has occurred (Mental Health Workforce Advisory Committee, 2008; National Health Workforce Taskforce, 2009). Consequently, there is interest in developing a range of approaches to either supplement or replace traditional approaches to clinical placement. The use of HFHPS may contribute to reducing the reliance on the use of clinical placements.

Adoption of HFHPS as an example of Rogers' Model of the Diffusion of Innovation

The patterns discernible in the uptake of HFHPS by nursing educational providers have several characteristics. Initial adoption began in the late 1990s, and had become a hallmark of quality education ten years later (Cannon-Diehl, 2009; Harder, 2009). This was despite the evidence for effectiveness being predominately dominated by reports of student satisfaction and perception of improved self-efficacy (Cant & Cooper, 2010; Fountain & Alfred, 2009). Application of HFHPS to curriculum has clustered in acute medical and surgical specialties (Katz et al., 2010). Finally, the teaching pedagogies favoured skill mastery, simple communication paradigms, elemental team work and debriefing models to enhance reflective practices (Flanagan et al., 2007). There is increasing interest, however, in the use of HFHPS to help higher order learning objectives such as the development of clinical reasoning (Lasater, 2005, 2007a, 2007b).

Speculative Applications of HFHPS in CAPN.

Although mannequin-based HFHPS may not in and of itself offer sufficient replication of CAPN clinical practice, it might offer an adjunct to improve other approaches to teaching and learning

nursing practice for this specialty. Other approaches may offer high fidelity simulation for mental health, and CAPN. As standardised patients more closely approximate the clinical environment, they could achieve high fidelity. But their application is limited in arenas of high risk (Framp et al., 2009). Could this be imaginatively addressed by combining with the benefits of HFHPS mannequin approaches? This has been developed in midwifery preparation to simulate high risk events such as shoulder dystocia (Goffman et al., 2008). Similar benefits could be developed for students preparing for practice in mental health or CAPN nursing. A richness is potentially available to break from the monotropism (Murray et al., 2005) of typical single 'dialogue' training to encompass more of the complexities of CAPN and mental health nursing through the use of mannequin based HFHPS in conjunction with other simulation. High acuity events, like epilepsy could be more realistically incorporated with the use of a HFHPS quite clearly. However it is probably in the exploration of the possible verbal functions of HFHPS that applications to developing skill in approaches such as narrative therapy might be developed. This is assuming that such therapies are in the realm of pre-registration nursing preparation – a further conversation for the profession.

Conclusion.

Mental Health Nursing adoption of HFHPS provides evidence of the original contention of this paper: that the process of diffusion of innovation described by Rogers (2003), namely the adoption of HFHPS is discernable in mental health nursing pre-registration preparation, but at an earlier stage than in medical surgical nursing. Adoption in the education of CAPN is not yet reported. However, it is asserted by the authors that this technology demands measured consideration for its potential to enrich pre-registration preparation for child and adolescent psychiatric nursing practice.

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