The Impact of Simulation on Graduate Entry Masters Students' Confidence to Provide Safe Patient Care: A Longitudinal Study

Abstract

Background

Simulation based education is a valuable learning approach for nursing students, yet there is limited focus or reports on graduate entry masters (GEM) programs. This study explores the effect of simulation on GEM students' confidence to provide safe patient care.

Methods

A longitudinal, single site, cohort design using the Health Professional Education in Patient Safety Survey to measure nursing students' (n=32) confidence pre-and-post simulation and post-clinical.

Results

Overall confidence increased post simulation but was not always sustained post clinical practice.

Conclusions

SBE can build students' patient safety confidence, however the dynamic nature of the clinical setting challenges student confidence.

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Background

Following the rapid growth of simulation-based education (SBE) in health professions programs, there has been much interest in determining the impact of this contemporary educational approach. For health professional education, the impact of SBE on learner outcomes and how this translates into subsequent practice are particular areas of current investigation (Seaton et al., 2019). However, the focus of research tends to be on practicing clinicians and high performing teams (Lewis et al., 2019) rather than students and safe patient care.

For undergraduate students, there has been abundant reporting of learner satisfaction with, and increased confidence following, SBE (Foronda, Liu, & Bauman, 2013; Zulkosky, 2012), some focus on patient safety related to simulation (Liaw, Zhou, Lau, Siau, & Chan, 2014; Seaton et al., 2019) and emerging longitudinal studies capturing translation to practice (Bruce, Levett-Jones, & Courtney-Pratt, 2019; Thomas & Mraz, 2017; Walsh et al., 2018). However, there is scant literature identifying the impact of SBE on varied nursing student cohorts, particularly those who undertake accelerated or graduate entry Master (GEM) degrees and bring well developed life, educational and work experiences to their learning (Basak, Unver, Moss, Watts, & Gaioso, 2016; Kaddoura, Vandyke, Smallwood, & Gonzalez, 2016).

In Australia, there are several entry options into nursing programs. A 'standard' Bachelor program consists of six or seven semesters (three or three and half years) of study and clinical experience. Generally, this program comprises recent school leavers and some mature aged students making a career change to nursing. Conversion programs, generally of 2-year duration, are provided for Enrolled Nurses (EN) to upgrade their qualifications to

practice as Registered Nurses (RN). Several higher education providers offer a Master of Nursing degree leading to RN registration. Students in such programs hold a minimum of a Bachelor qualification, have varied work and life experiences and often have diverse cultural backgrounds. However, students in these Masters programs generally have little or no prior experience in healthcare or the Australian healthcare context (Everett, Salamonson, Trajkovski, & Fernandez, 2013). Hence, curricula are specifically tailored for these student cohorts.

The Master of Nursing Practice GEM program at (de-identified for review) University is a 2-year (fulltime) preregistration nursing course available to domestic and international onshore students. The course, accredited by the Australian Nursing and Midwifery Accreditation Council, provides a comprehensive study program involving a range of contemporary blended learning approaches, including advanced clinical skill development, simulated practice and clinical placement. The course emphasises close integration of evidence-based theory and clinical practice. Theory content is comprehensive including the physical, biological, behavioural, social science and practical. Given the diverse backgrounds of the Masters student cohorts, a dedicated SBE program has been incorporated into the course to ensure appropriate preparation for students' clinical placements in Australian healthcare settings.

The practical component of the course comprises five units of study, each incorporating theory, skills laboratories and specific simulation scenarios that complement the theory, skills and pending clinical experiences. Additionally, one of the behavioural science units offers a concurrent, comprehensive and holistic mental health simulation experience. In total, students completing the course will experience 840hrs of clinical experience and 168hrs of SBE.

Patient Safety Within Curricula

The focus on patient safety within nursing curricula cannot be overemphasised particularly when, on entry to the workforce, the expectations of health services and health consumers is that new graduate nurses provide safe and responsible patient care (Cantlay et al., 2017). Yet the development of student confidence in patient safety knowledge requires greater efforts (Usher et al., 2017). Killam et al. (2013) reported first year nursing students' viewpoints about compromised patient safety in the clinical areas, specifically an overwhelming sense of inner discomfort, instances of practice contrary to conventions, on occasions a lack of professional integrity and disharmonising relations. Subsequent work by the group, this time reporting third year nursing students' opinions about circumstances that threaten patient safety, revealed a lack of readiness, misdirected practices, and negation of professional boundaries (Montgomery, Killam, Mossey, & Heerschap, 2014). Further, students felt it was most unsafe when novice nurses failed to consolidate an integrated cognitive, behavioural, and ethical identity.

Frameworks Guiding this Research– Learning, Practice and Patient Safety

Socio-cultural theoretical frameworks, such as Community of Practice (Lave & Wenger, 1991), highlight that learning is a social, rather than solitary, enterprise enabled through activities and interactions that foster engagement and inquiry with peers and experts. SBE offers such learning experiences where students from diverse backgrounds can explore, confirm and consolidate practice-related concepts in socio-material environments which replicate a variety of clinical settings (Maclean, Della, Geddes, & Kelly, 2019). Appropriate facilitation for the level of learner, is key to fostering student inquiry rather than providing didactic feedback (INACSL Standards Committee, 2016).

Reflecting global influences, patient safety is central to the Australian health care system and to the role of the RN. The Australian Commission on Safety and Quality in Health Care (ACSQHC) provides guidance for all health care institutions and their employees through the National Safety and Quality Health Service Standards which "provide a nationally consistent statement of the level of care consumers can expect from health

service organisations" (Australian Commission on Safety and Quality in Health Care, 2017). The *Registered Nurse Standards for Practice* guide the nursing student and cover the scope of practice and the professional expectations across the spectrum of practice, with an emphasis on safety and quality (Nursing and Midwifery Board of Australia, 2016). The simulations developed for the GEM course are structured to reflect these professional expectations and standards.

Research Aim

The aim of our research was to bring together several concepts which are underreported in the literature – investigating the translation of simulation into practice with a particular focus on patient safety in relation to GEM students who are typically advanced learners who bring diverse cultural and life experiences to SBE and clinical practice. The research question is: what impact does a dedicated program of simulation have on graduate entry master's students' confidence in their patient safety knowledge for clinical practice?

Methods

Study Design

This research adopted a single site, longitudinal cohort study design using an electronic survey and convenience sampling approach, with preregistration nursing students in a GEM program of study. The Reporting Guidelines for Health Care Simulation Research (Fey, Gloe, & Mariani, 2015), a validated instrument comprising 16 elements considered to reliably report simulation research, was used to structure this paper.

Ethics. The study was approved by the university's Human Research Ethics Committee (HRE2017-0298, May 2017) and considered low risk. Two members of the research team were also teachers in the simulation. To mitigate undue influence, a comprehensive participant information form was provided to students explaining the research and the nature of their participation, including rationale, duration and purpose, and that data would be anonymised, analysed and disseminated in aggregate form. In addition,

advice regarding withdrawal from the research was provided, as were contact details for the complaints officer. This information was given in a plain English language statement.

Consent was sought freely, and potential participants were made aware (on the participant information form) that there would be no adverse outcomes for them should they choose not to participate or withdraw from the study at a later date. All participants were assured that they were able to decline to participate in the research without any consequences, and that no additional credit was offered for participating in the research. All participants were assured that data would only be accessible by research team members.

Sample and setting. An initial pilot study was undertaken with a prior cohort of students, enrolled in a second-year clinical unit in semester 2, 2017 at a large metropolitan Australian university. The pilot study served to ensure that the wording of the survey was comprehensible and that the explanatory information was adequate. For the longitudinal study, students new to course at the same university were recruited from the 2017 intake.

Procedure

The simulations for each semester were developed using an established in-house template, based on simulation expertise and literature (INACSL Standards Committee, 2016). In each semester, unit learning outcomes were mapped to the simulation and aligned with relevant patient safety priorities as well the *Registered Nurse Standards for Practice* (Nursing and Midwifery Board of Australia, 2016). The simulations have been repeated with each cohort of students since the course inception in 2014 and modified each semester based on student and tutor feedback, and changes in nursing practice. All scenarios across the course are informed by service industry partners and reflect situations that students are likely to encounter in the clinical setting. An overview of simulation details, contexts and delivery modes related to the data collection time points are presented in Table 1.

The sequence and interconnectedness of clinical skills practice, simulation and clinical practice experiences is outlined in Figure 1. Simulations followed theoretical and

laboratory-based content in order to consolidate and apply knowledge; all simulations preceded clinical placements. For each simulation, pre-briefing included intended learning outcomes, handover using ISOBAR format (Australian Commission on Safety and Quality in Health Care (ASQHS), 2017), a shift time-planner to assist students' time management, and allocation of roles. The number of students to experienced facilitators was 12:1 and students participated in the simulations in pairs, trios or small teams to provide peer support in learning.

When not participating, other students observed the simulation from an adjacent room via one-way glass. Observing students were provided with a guide to facilitate focused observation to enable additional, targeted feedback during debriefings. The observer rubric was created based on Levett-Jones' (2018) *Clinical Reasoning Cycle*, with students undertaking a simulation nominating a peer to observe them in one of the five "rights". Each student observer uses the rubric to make notes about the student's performance in the nominated "right". The rubric is to be handed back to the student after the simulation. Either student may request time to discuss the feedback. This request must be met as soon as possible, by negotiation with the simulation tutor. Every student must be observed in each of the 5 rights over the week. Students must nominate a different student observer for each of the 5 rights. Students can be observed in more than one "right" during any given scenario however a different student observer must be nominated for each "right". By the end of the week each student will have 5 peer observation records (one for each right). Each observation will have been undertaken by a different peer. The rubric has been in use since 2017 with modifications made following each semester based on student use.

The experienced facilitators led debriefing sessions using their preferred framework (Krogh, Bearman, & Nestel, 2016).

Instrument and data collection. Acknowledging the diverse socio-cultural elements of learning about patient safety, this study used Ginsberg, Castel, Tregunno, and Norton's (2012) data collection tool focused on entry-to-practice health professionals' perceptions. A

modified version of The Health Professional Education in Patient Safety Survey (H-PEPSS) was used with permission from the authors (Ginsburg et al., 2012). Over three semesters of the four semester-long degree, respondents were asked to complete the H-PEPSS before and immediately after each simulation, and after each related clinical practicum when next back on campus (see Figure 1). Demographics including age, gender, country of origin, languages spoken, and previous/type of work experience were requested.

The validated instrument (Ginsburg et al., 2012) measures health professionals' and students' knowledge and confidence in areas of patient safety, including clinical and system issues. Across the confidence part of the instrument (reported in this paper) there are 27 items that are clustered in seven domains: clinical safety, working in team with other health professionals, communicating effectively, managing safety risks, recognise, respond to and disclose adverse events and close calls, and culture of safety. There are no right or wrong answers, rather respondents indicate the degree to which they agree or disagree with the statements. The survey takes approximately 12 minutes to complete and was converted to a Qualtrics survey administered via an electronic link. With respect to the modification we made to the H-PEPSS, in addition to gathering data regarding the students' experiences of learning about patient safety in the classroom and the clinical setting, we added a column "in simulation". While the H-PEPSS measures a range of patient safety variables, this paper only reports the data collected by the confidence domains.

Data Analysis

Data were imported into R (R Core Team, 2019). Student responses were excluded if there was less than 50% completion of the questionnaire (total number of excluded responses across 9 time points = 8). Domain scores for the H-PEPSS were calculated by averaging over each of the questions within the domain for each participant. If participants had missing values for a question within a domain (but still had greater than 50% completion), the domain score was calculated using the available data.

Descriptive statistics (means ± standard errors of the mean) were used to summarise the responses of the group at each time point (pre-simulation, post-simulation, and post-clinical placement) over the semester (semesters 1, 2, and 3). Participants were unable to be identified at each collection point due to ethical constraints of the relatively small class size, therefore a formal statistical analysis was not undertaken. However, the general trends in the aggregated data are described.

Results

Students enrolled in the course completed the H-PEPSS on nine occasions. Table 2 details the number of students enrolled in the course at each semester, along with the number of participants with useable data at each collection point within the semester. The number of completed questionnaires was lowest for the post-clinical collection point in semester 1, resulting in 15 participants not attempting the questionnaire (along with three participants with less than 50% completion). The collection process was subsequently modified to allocating class time for survey completion at all time-points via the electronic link for the remaining semesters, to maximise response rates (Cooper & Brown, 2017).

At the first time point in semester 1, the majority of respondents were female (94%) with mean age of 29 years (SD = 6.5). In addition to the Bachelor degree qualification required for entry to the program, 31% of respondents already had a Master's degree. The majority did not have previous training in a clinical setting prior to the program (see Table 3). Demographics of students in semesters 2 and 3 were similar to semester 1.

Student confidence related to specific patient safety content areas increased post simulation in all semesters for the seven H-PEPSS domains (Figure 2). However confidence built during simulation did not appear to be maintained post clinical, with a decrease reported in five domains in semester 2 (*clinical safety, working in teams, communicating effectively, adverse events* and *culture of safety*) and two domains in semester 3 (*working in teams* and *managing risks*). The working in teams domain incorporates team dynamics and power,

conflict, supporting other team members, engaging the patient in the team, authority, decision making and leadership, and advocacy. The managing risks domain incorporates anticipating and recognising risks, and identifying solutions.

Discussion

The aim of this research was to explore the impact of a dedicated program of SBE on GEM students' confidence in their patient safety knowledge for clinical practice. The overall findings demonstrated that simulation markedly increased student confidence in knowledge of patient safety for clinical practice over the nine time points.

In semester 1, there was an increase in confidence in all of the domains except for working in teams. An increase in confidence is not unexpected as the student develops an initial understanding of the RN role through course experiences. This may also be explained by the nature of the first clinical placements in aged care (2 weeks) and community practice (2 weeks) where students' clinical practice is closely supervised. The scope of their nursing practice in the first semester is focused on developing the foundations of nursing care, where communication and patient assessment is undertaken in a clinical context where the patient is considered well and stable. Working in teams is considered a developmental process that may have been influenced by the time frame in clinical practice, the clinical context, the supervision model and the nursing care model in the clinical setting. In simulation, teamwork is most often developed through peer support which may not mirror the clinical environment (Moore, Finch, MacArthur, & Ward, 2018).

In semester 2, foundation skills and knowledge of the RN role are further developed by the student. At this point, learning through simulation is focused on the acute care sector and unwell but stable patients with a predicable care trajectory. The simulation scenarios reflect predicted interactions that relate to patient care needs whilst working within teams. The student is expected to use predictable cue recognition with similarity of patient responses to guide clinical decision making. Subsequently, simulation is structured and

scaffolded which may not reflect the subsequent unpredictability of clinical reality student's experience.

Semester 2 also presents students with the first acute care hospital experience which likely influences confidence in different ways compared with their first clinical practice. The realities of acute clinical settings, which include complex and critically unwell patients, may explain the changes in confidence levels seen following semester 2 clinical placement. At this stage of their development students' scope of practice expands as the accountability and the responsibilities of RN role become more evident (Frögéli, Rudman, & Gustavsson, 2019). Further exacerbating students' perceptions and subsequent confidence is a new clinical context that is unfamiliar and unpredictable, compared with SBE. Thus, the students' perceptions of being effective in care is likely influenced by their affective responses to unfolding situations (Bondy, 1983). Changes in confidence in semester 2 may also be attributed to students' "culture-shock" as they adjust to a new cultural situation, acute clinical settings, that has less meaning and requires a range of emotional responses (Adler, 1975 Cummins, Catling, Hogan, & Homer, 2014; Maginnis & Anderson, 2017; Strouse & Nickerson, 2016). Milstein (2005) suggests that although culture shock is a normal but unpleasant experience, ultimately it can lead to a positive learning experience through adaptation, increased learning and self-efficacy.

In semester 3, students were more involved in the configuration of the SBE with opportunity for student-led simulations. The acquisition of new knowledge and skills from the previous semester was applied as they challenged their skills and confidence in patient safety. At this point in the course, students would have a well-developed understanding and awareness of: the RN role, scope of practice, social-cultural aspects of the workforce, complex patient care, and the nature of the health care setting enabled through four, diverse clinical experiences. Post clinical semester 3 there was sustained increase confidence in three domains (*communicating effectively, understanding human & environmental factors*, and *culture of safety*). However, the 'interrupted' positive trends in some H-PEPPS domains

(*working in teams, managing safety risks, recognising, responding to and disclosing adverse events)* may be explained by the presentation of new challenging contents of complex patient care as well as the contextual differences between SBE and clinical experience.

Although gaining experience as they progress, students are considered novices in the first three semesters of the course. In each semester the student is learning new material and is almost always returning to a fundamental basis of knowledge and practice. Within each semester of learning it could be argued that the student remains reliant on applying 'rules and regulations' to guide their practice. This thinking aligns with Benner's beliefs of novice to expert (Benner, 1984). These mature GEM students came to the course with, in general, greater life and work experiences than students in the standard undergraduate Bachelor course, who are typically recent school leavers. Although GEM students have requisite knowledge from previous work and life experiences, socialising into the health service settings can be a substantial adjustment (Cantlay et al., 2017). While likely more willing to speak up on issues that may compromise patient safety, their novice position, perceived power differentials and perhaps cultural ethnicity or beliefs may hinder responses or actions in the clinical setting compared with in simulation (Read & Laschinger, 2017).

Strengths, Limitations and Areas for Further Research

The longitudinal design provides opportunity to understand key aspects of patient safety that impacted positively and negatively on students' confidence in the simulation and clinical context with outcome measures examined at each semester.

Limitations of the study included that the study was conducted at a single site with a small sample of nursing students. The results could be generalised to other nursing programs that offer a graduate entry pathway and have a dedicated simulation education component as part of the course. Although differences in student cultural backgrounds were evident, and may have influenced responses to SBE and clinical practice, this was not explored in the current study. Ethical constraints at the time of study initiation limited our

ability to assign truly anonymous unique identifiers to each student that would allow a full longitudinal statistical analysis (e.g., there were only two male students in the cohort). Instead, we were limited to an estimation of trends through examining aggregated data. The study findings are further limiting as only self-report measures were applied.

The longitudinal study, using interviews, will be extended to explore participant experiences of patient safety 6 months and 18 months following course completion and employment. Future studies could include observational components to the simulation for further data analysis, and/or undertake focus group or individual interviews to provide richer descriptions of circumstances which influence or inhibit expected reactions. Further examination of the factors that influence confidence about patient safety and practice following clinical experiences is required.

Conclusions

This research provides insights about the impact of repeated SBEs on GEM students' understanding and applicability of patient safety concepts for practice. It is apparent from the trends in the data that students' confidence to provide safe patient care improves from one semester to the next across the GEM degree. Some areas of patient safety show smaller gains in confidence from the start of the course to the end, but start from a higher base point, such as hand hygiene, infection control and safe medication practices and safe clinical practice generally (H-PEPPS clinical safety domain). Other less technical elements of RN practice show larger shifts in confidence, such as managing safety risks including anticipating and recognising risks, and identifying solutions as well as human factors such as fatigue and environmental aspects including work flow and ergonomics. We advocate the inclusion of simulation to develop students' confidence to provide safe patient care and safe environments for patients.

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Table 1.

Details of Simulation Hours, Context and Delivery Mode Across Three Semesters

Semester	Simulation Hours Per Student / Syllabus	Context	Delivery Mode
1	8hrs Fundamentals of nursing	Orientation, communication, therapeutic relationship building	Tutor led
2	40hrs Admission to discharge nursing care of an uncomplicated surgical patient	Admission Pre-op care Post op care Removal of IVC, IDC and wound drains Discharge	Tutor led
3	40hrs Behavioural and mental health care	Auditory hallucinations and hearing voices Communication with emotionally disturbed persons in the emergency department Communication with persons experiencing thought disorder (delusional ideation and form of thought disorder) Communication with persons experiencing suicidal and self-harm ideation Communication with highly anxious persons	Tutor led
3	40hrs Complex nursing care	Cardiac 4hrs nursing care of a patient post angiogram 4hrs nursing care of a patient pre, intra and post cardioversion	Tutor led
		Respiratory 4hrs nursing care of a patient post thyroidectomy 4hrs nursing care of a patient with acute asthma	Tutor led
		Neuro and Trauma 4hrs nursing care of a patient with an acute head injury post fall from height 4hrs nursing care of a trauma patient cyclist vs motor vehicle	Student led
		Blood and burns 4hrs nursing care of a patient presenting with acute face and hand burns 4hrs nursing care of a patient experiencing post-partum haemorrhage	Student led
		Advanced life support The roles of nurses in ALS	Tutor led

Note. The total number of simulation hours presented in this table (128) reflects only the first three semesters' simulation within the course and does not reflect the additional 40 hours of simulation in semester 4. This is because the simulation hours in semester 4 do not contain new content and instead consolidate prior learning.

Table 2.

Total Enrolled Participants in the GEM Course and the Number of Completed Questionnaires (>50%) at Each Collection Point

Semester	Total Enrolled	Participants with > 50% completion		
		Pre-Sim	Post-Sim	Post-Clinical
1	32	32 (100%)	26 (81%)	14 (44%)
2	32	32 (100%)	29 (91%)	32 (100%)
3	29	28 (97%)	28 (97%)	22 (76%)

Table 3.

Participant Demographics

Characteristics	Response	Frequency (*n* = 32)
Gender	Female	30
	Male	2
Age (years)	22-25	12
	26-30	11
	31-35	4
	36-40	1
	41-45	2
	46+	1
	Missing	1
Highest qualification	Bachelors	19
	Masters	12
	Missing	1
Training in a clinical setting prior to the program	No	21
	Yes	11
Languages (All students must have English to IELTS 7.0 all bands and minimum 7.0 overall. Some students had two additional languages).	English only	12
	Additional Languages:	
	Mandarin / Cantonese	11
	Italian	2
	Hindi	2
	Persian	1
	Russian	1
	Spanish	1
	Vietnamese	1
	Punjabi	1
	“Native” language	1
	Nepali	1
Country of birth	Australia	11
	China	9
	Asia other than China	5
	Zambia	2

	Europe	2
	Middle east	1
	South America	1
	Missing	1
Time lived in Australia	Born in Australia	9
	Less than 1 year	8
	1 to 2 years	4
	3 to 5 years	4
	6 to 10 years	4
	More than 10 years	2
	Missing	1

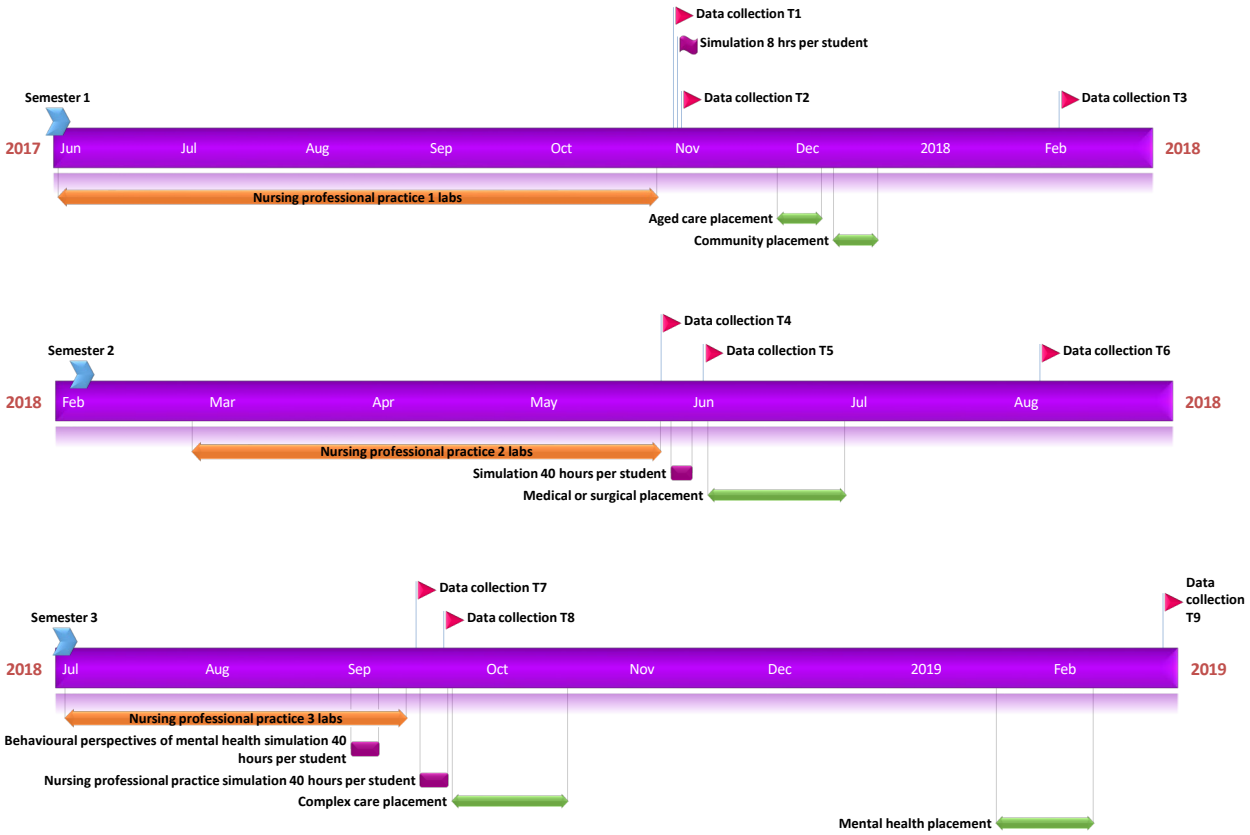

Figure 1. Overview of course content, data collection points and clinical placements for the longitudinal study.