

Standardized language systems for the design of high-fidelity simulation scenarios: A Delphi study

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Abstract:

Purpose: This study aimed to identify which of the standardised Nursing Interventions Classification (NIC) activities should be used in the design of clinical cases with high fidelity simulation for educational preparation of undergraduate nursing students in non-technical skills.

Design and methods: A three-round Delphi study was carried out: the first round with taxonomy experts, the second round with academic and clinical lecturers with limited experience in the simulation-based learning methodology, and the third round with academic and clinical lecturers having at least two years of simulation experience. The NIC interventions were grouped into two levels of competence in accordance with the undergraduate nursing degree curriculum (1st- and 2nd-year students, the “novice” level; 3rd- and 4th-year students, the “advanced” level). The NIC allows the description of nurse student competencies in multiple clinical scenarios and throughout various contexts: theory, clinical practice and simulation.

Findings: The experts identified 163 interventions in 8 areas as relevant and feasible, selecting 42 for the “novice” students, in Nursing Fundamentals (13) and Adult Nursing Care 1 (29), and 97 for the “advanced” students: Maternity Care and Child Health Nursing (18), Mental Health (13), Nursing Care of Older People (12), Community Health Nursing (20) and Adult Nursing Care 2 (34). In addition, 24 interventions were identified as cross-cutting, with training to be provided across all four years of the degree.

Conclusion: A total of 163 interventions of the NIC list were selected by experts as being both relevant and feasible to nursing undergraduate education. This creates the favourable framework to design high-fidelity scenarios for the training of non-technical skills according to the competences required and in line with the health care reality. Therefore, enabling an optimal combination of theoretical education by academic lecturers with practical training by clinical lecturers and staff nurses.

Keywords:

Standardised nursing terminology, High-fidelity simulation training, Non-technical skills, Nursing students, Theory-practice gap

1. Introduction

1.1. Background

In 1974, the concept of the “theory-practice gap” emerged in the field of nursing education (Kramer, 1974). Forty years later, Monaghan (2015) and Liaw et al. (2015) conducted a review of the concept, considering it a persistent cause of nurses leaving the profession in the current century. Nursing practice is more than the collection of techniques and skills; it is the integration of knowledge and skills which contribute to the character and development of practice. “The theory practice gap is the inability to relate and implement ideological knowledge gained in education to the realities of modern day health-care practice” (Monaghan, 2015, p. 1). Possible explanations for the theory-practice gap include role insecurity, lack of confidence in their own abilities, and inadequate proficiency in clinical skills when Nursing graduates enter the profession (Liaw et al., 2015).

Monaghan (2015) suggested strengthening and improving mentoring programs for nurses during their clinical education, and others have called for stronger connections between the staff nurses, clinical lecturers, and academic lecturers involved in the education and evaluation of undergraduate nursing students in Europe (Gainsbury, 2010; Raurell-Torredà et al., 2018). Staff nurses are registered nurses who supervise students in clinical placements, acting as mentors and giving feedback to the clinical lecturers. Clinical lecturers are mentors who, in addition to their main professional activity in clinical settings, also work limited hours as faculty members in charge of students assigned to clinical placement. Academic lecturers are Nursing faculty members responsible for teaching the core courses.

1.2. Simulation-based education

One instructional approach that has been shown to increase confidence amongst student nurses is the use of simulation to replicate clinical scenarios (Liaw et al., 2015). In the last decade, the use of simulation as a teaching-learning method has increased at a global scale for several reasons: a decrease in the clinical placements, reduction in the duration of patient stays, and a higher level of concern in safe care by the general public. “Due to a number of reasons such as the complex nature of real world practice, the high patient acuity levels and the need to mitigate risk and maximise safety and quality in the delivery of care, hospitals cannot support old models of learning on the job by ‘trial and error’. Thus a safer setting for this form of experiential learning and the practise of core skill is now undertaken in the simulation environment” (Parker and Grech, 2018, p. 48). Bogossian et al. (2019) shows how simulation-based education has been regulated in different countries. In the UK, the Nursing and Midwifery Council (NMC), in their 2009 policy, stated that 300 h of the required 2300 h (13%) of clinical practice can be replaced with simulation practice. In a review under-taken in June 2017, the NMC proposed that simulation could be used for up to half of the 2300 practice hours required to become a registered nurse. In the USA, each state sets its own regulations, ranging from 20 to 50% of the clinical practice education in the form of simulation (Breymer et al., 2015). A study by

the US National Council of State Board of Nursing (NCSBN) showed to be safe to substitute up to 50% of the clinical practice with simulation (Hayden et al., 2014).

This methodology not only improves clinical skill preparation in a safe environment but also strengthens the capacity to build inter-professional relationships. Both academic and healthcare institutions are responsible for developing nursing students' clinical competencies, in order to enable them to enter into practice with the required skills for patient safety and quality of care. The design and implementation of simulation education is conducted with academic and clinical lecturers together. In this way, it is ensured that the scenarios are consistent with the healthcare assistance reality. The collaboration between clinical lecturers and staff nurses as mentors enables the students to learn directly from nurses that are actually working and are familiar with the work environment and its complex organization. Additionally, academic lecturers can support clinical lecturers with their knowledge on pedagogy and teaching methodologies. In this sense, academic lecturers can guide the building and education of mentors and clinical lecturers (Liaw et al., 2015; Murray et al., 2010).

Simulation-based learning is a student-centred methodology that promotes an immediate and participative feedback between professors and students. The aim is to develop both technical skills (required to accomplish a specific task) and non-technical skills (communication, leadership, teamwork, situational awareness, decision-making, resource management, safe practice, adverse event minimization/mitigation, and professionalism) (Lopreiato, 2016; Meakim et al., 2013). For training technical skills, low-medium fidelity simulation is used (task trainers or static manikin), not needing to be controlled or programmed externally for the learner to participate. For the education on non-technical skills actors can be trained as standardised patients (SP) or use a High-Fidelity Simulator (HFS), a term often used to refer to the broad range of full-body manikins that have the ability to mimic, at a very high level, human body functions. Such manikins allow for simulation experiences that are extremely realistic and provide a high level of interactivity for the learner (Lopreiato, 2016). Both methodologies, low and high fidelity, enable the students to learn the nursing procedures related to the processes of assessment, diagnosis, care and treatment for mental, physical, cognitive and behavioural health challenges (NMC: Standards of proficiency, annex B, p. 23).

Non-technical skills training can help newly qualified nurses to better understand their own role as a nurse, to know what others expect from them in professional practice, and to improve their self-confidence. Simulation allows the student to identify knowledge or skill gaps and take responsibility for rectifying their shortcomings. Students gain self-awareness of their weaknesses as they develop expert practice as nurses (Raurell-Torredà et al., 2018). Consequently, all professional groups that take part in the nursing education should agree on which nursing interventions should be programmed in the different clinical cases. This, in turn, will allow the integration of theory with practice in the simulation laboratory and ensure an adequate progression of competencies during the 4 years of the degree program. Therefore, a standardised classification of the activities that nurses perform is needed.

1.3. Standardised language

The Nursing Intervention Classification (NIC) is a research-based clinical tool that standardises and defines the knowledge base for nursing practice. Each intervention in the NIC is listed with a label name, a definition, a set of ordered activities for carrying out the intervention and a small list of bibliography references (Bulechek et al., 2013).

An example of such is given in Table A (Supplementary material). Developed at a worldwide level, the NIC has been adopted in many health care centres, is integrated into computer systems, and is widely used in clinical practice to help nurses choose appropriate interventions.

This standardised nursing language system has been included as a guide for structuring the curriculum around competencies, grounded in the definitions that this system provides. It allows the description of nurse competencies in multiple clinical scenarios and facilitates the comparability between different contexts (from intensive care units to home care, geriatric care, and primary care) (Iglesias-Parra et al., 2015).

In this sense, the NIC is a language known by the three professionals involved in the nursing education: staff nurses, academic and clinical lecturers. Using the NIC, the competencies of the undergraduate students can be structured throughout various contexts: theory, clinical practice and simulation. It is important to note that the simulation scenarios used in the nursing education have to be commensurate with the level of competence acquired by the student during the theoretical and clinical practical education (Parker and Grech, 2018).

1.4. Education models and/or learning theories

A number of educational models and/or learning theories can guide the development and strengthen the design of simulation-based learning (Lavoie et al., 2018). The model “from novice to expert” was created by Benner (1984) to help transfer nursing knowledge from the classroom to the clinical practice. Such transfer is, precisely, the topic addressed by our study: how the NIC language, which is known by all the professionals involved in the education of nursing students, helps better integrate the theory, the clinical practice and the simulation, thus providing the newly registered nurse with the underpinning knowledge and skills required for their role in providing and evaluating person-centred care (NMC Standards of proficiency, 2018, p. 11).

Benner's model considers five levels of competency: novice, advanced beginner, competent, proficient, and expert. From these five levels, we consider the first two (novice and advanced beginner) are appropriate for inclusion in the undergraduate Nursing degree program. Novice students focus on measurable objectives, such as vital signs, and perform the interventions according to the rules learned in class. The more advanced students have had enough practical experiences to relate signs and symptoms with the appropriate disease and perform the interventions according to the correct protocols.

The aim of this study was to reach a consensus about which interventions should guide undergraduate training in non-technical nursing skills, using high-fidelity simulation.

2. Methodology

A three-round e-Delphi survey was conducted by e-mail between November 2016 and April 2018. Prior to the first round, the research team compiled a list of interventions, based on the 53 speciality core interventions in the sixth edition of the NIC (Bulechek et al., 2013). The research team adapted the list to our educational and health context, compiling a list of 489 NIC interventions distributed across 8 speciality areas. This list is referred as List 0.

2.1. Participant selection and recruitment

Criteria for first-round panelists were membership in the National Association of Nomenclature, Taxonomy and Nursing diagnosis and a well-established scientific publication record and/or outstanding academic experience. These experts were identified on the basis of their participation in professional commissions and their relevant publications. We conducted a bibliographic research in international databases (PubMed and Cinahl) in order to identify the potential candidates. There were not a minimum number of publications stipulated. In addition, this project was presented to the national association's board of directors, who were asked to suggest members with the appropriate experience and commitment to preparing undergraduate nurses; 51 panelists agreed to participate.

Given that the panelist in round 2 and 3 had to be experts in different areas of expertise but always in the context of undergraduate nursing education, we decided to involve universities to provide us with these experts. The universities involved in our study were those that promote teaching innovation and have introduced simulation in their undergraduate nursing program. Department heads were contacted and asked to suggest panelists from professors in their departments, according to their area of expertise.

Criteria for second-round panelists were that they be academic or clinical lecturers in the Nursing degree programs of the universities that participated in the study and have 5 years' experience as professors in the program and fewer than 2 years' experience in simulation as a teaching-learning methodology. 160 panelists agreed to participate.

Criteria for third-round panelists were that they be academic or clinical lecturers in the Nursing degree programs of the universities that participated in the study and have at least two years' experience in simulation as a teaching-learning methodology. A minimum of 160 h of high fidelity simulation delivery was required for the professors to be included in the third round of the study. They were selected from a list suggested by the same department heads who participated in the selection of second-round panelists; 33 agreed to participate. Fig. A (Supplementary material) shows the flow diagram and number of participants in the study.

2.2. Data collection

First-round panelists received "List 0" with the corresponding NIC codes, labels and definitions to be selected for analysis. This expert panel assessed the different interventions in List 0 according to their suitability for high-fidelity simulation as a training modality.

The research team distributed and categorised the selected items "List 1" according to the Nursing degree curriculum, as follows:

- Novice students (1st and 2nd years): Nursing Fundamentals, Ethics, Psychology, and Adult Nursing Care 1.
- Advanced students (3rd and 4th year): Maternity Care and Child Health Nursing, Community Health Nursing, Nursing Care of Older People, Mental Health Nursing, and Adult Nursing Care 2.

Second-round panelists were asked to select the List 1 interventions they considered appropriate to high-fidelity simulation in the courses they teach. In both rounds, panelists were given a Likert-type scale, ranging from 1 (not

relevant) to 5 (highly relevant), to score each intervention. Additionally, they were invited to propose other interventions they considered important for inclusion in the third-round expert panel discussions. All panelists received an anonymised summary of the responses to the questionnaire they had completed.

Round three was divided into two phases. In the first phase, the expert panel (33 simulation specialists) was asked to assess not only the relevance but also the feasibility of high-fidelity simulation as a training method for each intervention identified in the previous round (List 2), either with a high fidelity simulator or a standardised-patient actor.

The relevance of each intervention was assessed using the same Likert-type scale as in rounds 1 and 2. Feasibility also was assessed using a Likert-type scale, ranging from 1 (unfeasible) to 4 (highly feasible). The responses were defined as follows: 1) unfeasible intervention, impossible to be practiced as a simulation in the Nursing degree program; 2) barely feasible intervention, but remarkably interesting and could be practiced in a simulation if the academic calendar had enough flexibility; 3) feasible intervention that 25% to 50% of the students should practice in simulation; 4) highly feasible intervention that as students should practice in simulation.

In the second phase of this final e-Delphi round, the research team used the feasibility list ("List 3") to compile a list of interventions that obtained a low consensus in relevance in the first phase, interventions with high consensus in relevance but disparity in feasibility scores, and the new NIC codes proposed to the third panel. Based on this "List 4", the 19 panelists who completed both phases were asked to elaborate on the reasons behind the observed disparity in feasibility. A qualitative analysis of these expert opinions was carried out, as described below.

A "Final List" was created to combine the interventions that were considered highly relevant in Lists 3 and 4 with qualitative analysis of the interventions on List 4 that showed disparity in the assessments of feasibility.

2.3. Data analysis

In each phase, a descriptive analysis of the data was prepared. The standard deviation, mean and percentage of experts who considered each intervention to have met the required level for consensus were computed using a Microsoft Excel® spreadsheet.

The criteria used to decide the level of consensus about the relevance of an intervention to simulation training (on the 5-point Likert scale) were as follows (Hearnshaw et al., 2001; Hsu, 2007):

- High consensus: mean response was equal to or greater than 3 and at least 80% of participants scored the intervention with at least 3 points
- Low consensus: mean response was equal to or greater than 3 and 70–79% of participants scored the intervention with at least 3 points.
- No consensus: mean response was less than 3 and less than 70% of participants scored the intervention with at least 3 points.

The criteria used to decide the consensus in feasibility (on the 4-point Likert scale) were as follows:

- High consensus: mean response was equal to or greater than 2 and at least 80% of participants scored the intervention with at least 2 points

- Low consensus: mean response was equal to or greater than 2 and 70–79% of participants scored the intervention with at least 2 points.
- No consensus: mean response was less than 2 and less than 70% of participants scored the intervention with at least 2 points.

Interventions with high disparity in feasibility scores (defined as scores at opposite ends of the Likert scale from 3 or more experts) but high consensus in relevance were included in List 4 and subjected to a qualitative analysis in the second phase of the third round.

The qualitative analysis of the arguments presented by the expert panelists was done with Atlas.ti software. Six consensus categories (C1–C6) and two subcategories (a, b) were established, as follows:

- C1, relevant and feasible intervention (no discrepancies).
- C2, relevant and feasible intervention with limitations
 - C2a feasible only with a standardised patient.
 - C2b feasible only in 4th year.
- C3, intervention not possible to perform in simulation.
- C4, intervention not suited for degree students but feasible for simulation practice with graduate students.
- C5, intervention suited to train technical skills.
- C6, unable to give a reason about the discrepancy between relevance and feasibility.

2.4. Ethical aspects

The study obtained the approval of the bioethics committee of the University that coordinated the research (IRB00003099). Replying to the questionnaires implied consent to participate in the study as an expert panelist. In order to promote data protection, only the principal investigator kept contact with all the experts in each phase. Personal data were removed from the results matrix.

3. Results

Seventeen universities spread throughout the country were involved in the study.

Fig. 1 presents a summary of the process and the results of the three rounds. The expert panelists in the first round consisted of 51 experts in taxonomy.

Depending on the area of expertise, the number of panelists involved in the evaluation ranged from 4 to 10. From the assessment of List 0 items, 258 interventions were considered relevant with high consensus; 46 with low consensus and 185 with no consensus. In this first round, no intervention was eliminated from the list, whatever the consensus had been. Additionally, experts added 20 new interventions. The result was List 1 with a total of 509 interventions distributed across 8 speciality areas.

Prior to the second round, the research team redistributed List 1 into 9 speciality areas instead of the initial 8 because the second-round experts evaluated only the interventions related to the subjects they teach. Given that

mental health and psychology are taught in different years (according to current study plans), each of these two subjects were assigned as a speciality area.

The second-round panel included 160 academic and clinical lecturers without 2 years of experience in simulation. Depending on the area of expertise, the number of panelists involved in the evaluation ranged from 6 to 27. From their assessment of List 1, 241 interventions were removed for lack of consensus and 19 new interventions were added, following panelists' suggestions. The research team detected that 46 interventions were present in more than one area; these were considered as cross-cutting interventions. Despite reaching a high consensus, 31 interventions were eliminated because, although adequate for low-fidelity task trainers, they were not suitable for high-fidelity simulation. These interventions had been added by taxonomy experts (1st round) and academic and clinical lecturers (2nd round) who were not experts in simulation training. Therefore, they were not able to discriminate between interventions to be trained in high- or in low-fidelity simulation.

Given that interventions belonging to ethics and psychology also can be considered cross-cutting interventions, the research team realigned ethics (9 interventions) and psychology (16 interventions), as well as cross-cutting interventions (8 interventions) into one group: "cross-cutting interventions". The questionnaire (List 2) administered in the third round consisted of 218 interventions distributed across the original 8 speciality areas.

List 2 was sent to the third round of panelists (academic and clinical lecturers with more than 2 years of experience in simulation). The panel for this round consisted of 33 experts who answered the questionnaires of all areas of expertise, given that they were consulted as experts in simulation and not as experts in a specific area. As a result, 58 interventions with no consensus about relevance were eliminated. A pre-final list (List 3) was produced with the 160 interventions that achieved a high consensus in relevance and feasibility. List 4 contained the 20 interventions that achieved low consensus in relevance, 33 new interventions proposed by the panelists in the third round, and 32 interventions with high consensus in relevance but disparity in feasibility scores were prepared for evaluation in the second phase.

List 4 was evaluated by 19 of the 33 third-round panelists, all of whom were specialists in Nursing simulation. As a result of the quantitative analysis of the new interventions and the interventions with low consensus in relevance, three interventions on List 4 reached a high consensus in relevance and feasibility and were added to the Final List. Regarding the qualitative analysis, disparity in feasibility scores was observed for 32 interventions: Nursing Fundamentals (1), Adult Nursing Care 2 (1), Community Health Nursing (6), Maternity Care and Child Health Nursing (6), Nursing Care of Older People (6), Mental Health Nursing (9) and cross-cutting interventions (3). Panelists considered that 5 of these interventions were only feasible with a standardised patient but not with a manikin (category C2a). Regarding the remaining 27 interventions with discrepancies, the experts considered that simulation training was not an appropriate methodology because they require extensive material and human resources (category C3), suggesting that these interventions were more suitable for training during the clinical practicum.

Table 1 lists the interventions excluded after the qualitative analysis. None of the interventions subjected to qualitative analysis obtained a result of both relevant and feasible for simulation training (category C1). Therefore, none of these interventions were included in the Final List.

Finally, 163 interventions distributed across 8 speciality areas were identified as relevant and feasible for training in high-fidelity simulation; these constituted the Final List. The experts selected 42 interventions for the "novice" students, in Nursing Fundamentals (13) and Adult Nursing Care 1 (29), as shown in Table 2, and 97 for the

“advanced” students: Maternity Care and Child Health Nursing (18), Mental Health (13), Nursing Care of Older People (12), Community Health Nursing (20), and Adult Nursing Care 2 (34), as shown in Table 3a and b. In addition, 24 interventions were identified as cross-cutting, with training to be provided across all four years of the degree (Table 2).

4. Discussion

The NIC speciality areas contribute to the definition of nursing interventions, which enables the faculty to structure the undergraduate Nursing curriculum to include simulation training according to the competencies required as students' progress through the degree program. Along with the published recommendations on how to implement simulation training in the Nursing degree (Alexander et al., 2015; Rizzolo et al., 2015; Taplay et al., 2015), the use of standardised language may help to avoid a current difficulty in the clinical practicum: mentors who fail to perform an adequate assessment of nursing students because they do not share or understand the language used by the academic lecturers, which often is very theoretical and disconnected from clinical reality (Burden et al., 2018). Clinical lecturers, on behalf of the clinical mentors, and academic lecturers should be equally responsible for the education of future nurses. These simulated clinical cases that reflect the healthcare reality (Liaw et al., 2015; Parker and Grech, 2018) promote a connection between theoretical lecturing (such as masterclasses, seminars, problem-based learning) and training (in simulated scenarios or clinical placements) (Parker and Grech, 2018). Moreover, simulation provides an added value: error management training, which contributes to patient safety competencies (Levett-Jones et al., 2017). This area of education is still deficient in many university programs (Ginsburg et al., 2013; World Health Organization, 2011).

Our findings coincide with 64.2% of the interventions identified by Iglesias-Parra et al. (2015) for the evaluation of competencies during clinical practice in 2nd- and 3rd-year nursing students. We discarded from analysis those interventions recommended for practice with low-fidelity task trainers, which were not relevant to our study. If interpreted as a correlation analysis, the two studies are in moderate agreement.

Similarly, our results were in moderate agreement (63.6%) with a Korean study showing 30 interventions that 153 second-year nursing students identified as most frequently performed during the clinical practicum in medical-surgical units (Noh and Lee, 2015).

In the area of Mental Health, our results were less in agreement (50%) with Escalada-Hernández et al. (2015), even after including interventions in Geriatrics connected to mental disorders, such as dementia, frequently associated with older patients. This discrepancy may be explained, as in the area of Community and Public Health Nursing, by the less-developed simulation training in Mental Health compared to other areas, such as Adult Nursing Care I and II.

Finally, in the knowledge area of Maternity and Child Health, the agreement is also 50% between our study and the results reported by de Assis et al. (2015). This low level of correlation could be attributed to the limited use of simulation training in paediatrics nursing education in our context.

The authors conclude that high-fidelity simulation scenarios –with a high fidelity simulator or a standardised patient, as appropriate– can be designed for clinical cases using the interventions identified as relevant in each speciality. Standardised patients are recommended for training interventions that focus on communication skills, as this contributes to increased realism (Meakim et al., 2013).

The authors do not recommend using a checklist of activities included in the intervention to assess student performance on each activity during a simulated scenario. Instead, the NIC activities can be used to design the scenario and to define the cues that will be presented in the simulation (Meakim et al., 2013). Student performance should be assessed with validated checklists such as the Creighton Simulation Evaluation Instrument (Todd et al., 2008) or Lasater assessment rubric (Lasater, 2007).

One of the limitations of our study was the experts' identification of the more prevalent interventions in our health care system as the most important for analysis. Therefore, the results cannot be generalised to worldwide nursing education. Another limitation was the request that the experts assess only their fields of expertise; therefore, in the first and second round, not all the experts assessed all the interventions and the number of experts per area was not consistent. Although this may have had some influence on the outcome of the study, it is the authors' opinion that the impact was small and did not affect the study results.

5. Conclusions

A total of 163 interventions of the NIC list were selected by experts as being both relevant and feasible to nursing undergraduate education. This creates the favourable framework to design high-fidelity scenarios for the training of non-technical skills according to the competences required and in line with the health care reality. Therefore, enabling an optimal combination of theoretical education by academic lecturers with practical training by clinical lecturers and staff nurses.

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Tables

Table 1

List of interventions that were excluded as the result of the qualitative analysis (list 4).

Interventions only feasible to train with a standardised patient (not with a mannequin)	
<hr/>	
5244 Lactation counseling	
5260 End-of-life care	
5470 Role enhancement	
5230 Coping enhancement	
7460 Patient rights protection	
<hr/>	
Interventions not feasible to train in simulation	
<hr/>	
8700 Program development	4362 Behaviour modification: Social skills
5604 Teaching: Group	4310 Activity therapy
4480 Self-responsibility facilitation	0226 Exercise therapy: Muscle control
7320 Case management	6400 Abuse protection support
4360 Behaviour modification	4370 Impulse-control training
4700 Cognitive restructuring	4354 Behaviour management: Self-harm
6840 Kangaroo care	6510 Hallucination management
6800 High-risk pregnancy care	6450 Delusion management
6826 Infant care: Preterm	5390 Self-awareness enhancement
5666 Teaching: Toddler safety 19–24 Months	6470 Elopement precautions
5667 Teaching: Toddler safety 25–36 Months	6340 Suicide prevention
6612 Risk identification: Childbearing/Family	5328 Listening visits
0430 Bowel management	
4760 Memory training	
4720 Cognitive stimulation	

Table 2

Interventions considered relevant and feasible for simulation training in novice nursing students (1st and 2nd year) and cross-cutting interventions considered relevant and feasible for simulation training.

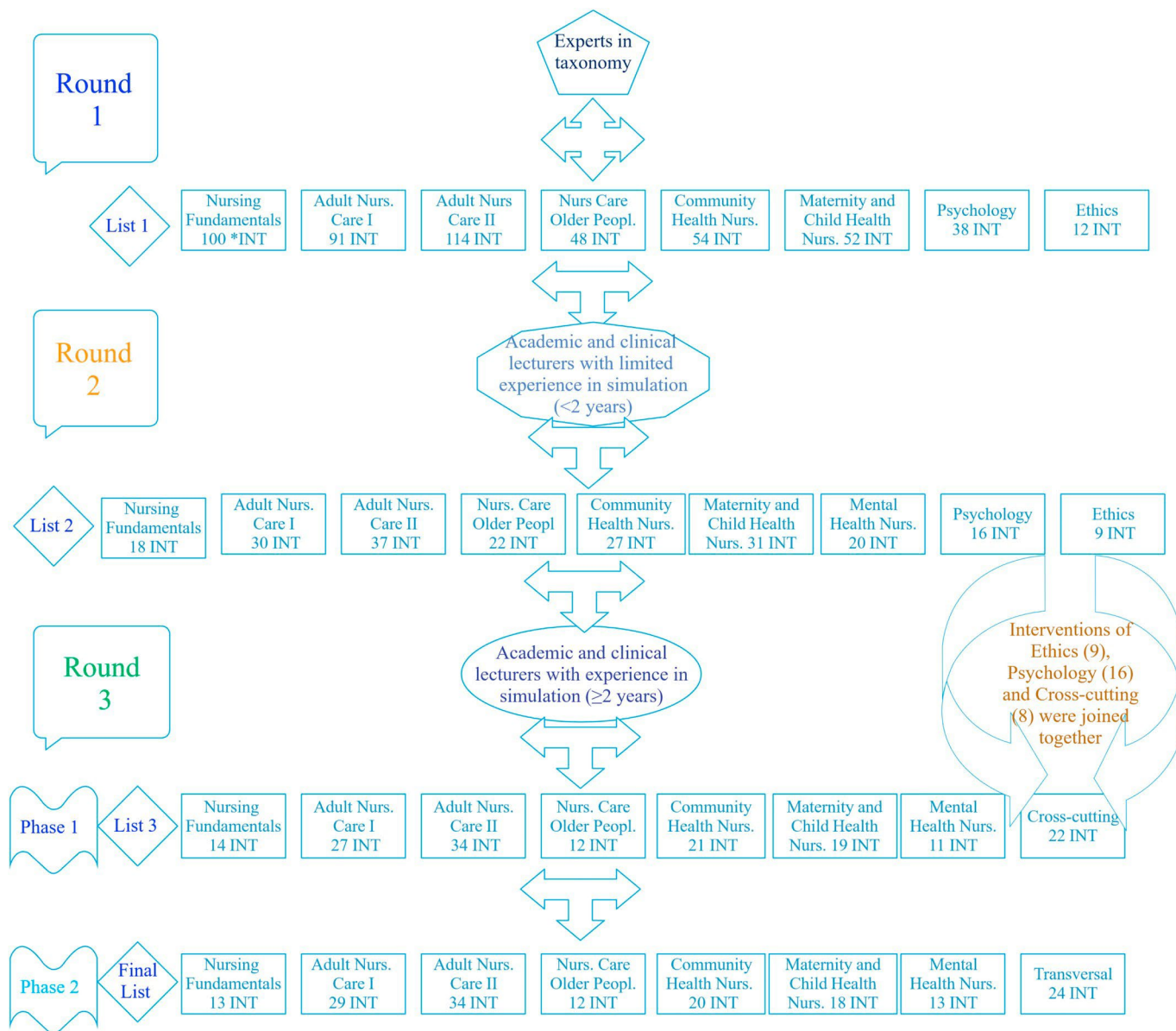
Adult nursing care I	Nursing fundamentals
430 Bowel management	200 Exercise promotion
450 Constipation/impaction management	1450 Nausea management
1400 Pain management	1805 Self-care assistance: IADL
1450 Nausea management	3540 Pressure ulcer prevention
2020 Electrolyte monitoring	5246 Nutritional counseling
2080 Fluid/electrolyte management	5606 Teaching: Individual
3200 Aspiration precautions	5616 Teaching: Prescribed medication
3320 Oxygen therapy	6410 Allergy management
3350 Respiratory monitoring	6486 Environmental management: Safety
3390 Ventilation assistance	6540 Infection control
4010 Bleeding precautions	6610 Risk identification
4020 Bleeding reduction	6680 Vital signs monitoring
4022 Bleeding reduction: gastrointestinal	7710 Physician support
4040 Cardiac care	5602 Teaching: Disease process
4044 Cardiac care: Acute	5618 Teaching: Procedure/treatment
4070 Circulatory precautions	6240 First aid
4120 Fluid management	6412 Anaphylaxis management
4130 Fluid monitoring	6490 Fall prevention
4170 Hypervolemia management	6540 Infection control
4180 Hypovolemia management	6550 Infection protection
4200 Intravenous (IV) therapy	7680 Examination assistance
Cross-cutting interventions	
2300 Medication administration	5510 Health education
2380 Medication management	5820 Anxiety reduction
2395 Medication reconciliation	6160 Crisis intervention
4920 Active listening	6574 Patient identification
5250 Decision-making support	7040 Caregiver support
5270 Emotional support	7140 Family support
5290 Grief work facilitation	7310 Admission care
5330 Mood management	7690 Laboratory data interpretation
5340 Presence	7880 Technology management
5380 Security enhancement	7920 Documentation
5395 Self-efficacy enhancement	7960 Health care information exchange
5460 Touch	8140 Handoff report

Table 3

Interventions considered relevant and feasible for simulation training in advanced undergraduate nursing students (3rd and 4th year).

a		
Maternity and Child Health Nursing	Mental Health Nursing	Nursing Care Older People
1100 Nutrition management	1030 Eating disorders: management	200 Exercise promotion
1160 Nutritional monitoring	4350 Behaviour management	221 Exercise therapy: Ambulation
2680 Seizure management	4360 Behaviour modification	222 Exercise therapy: Balance
2690 Seizure precautions	4380 Limit setting	1400 Pain management
3900 Temperature regulation	4410 Mutual goal setting	4974 Communication enhancement: Hearing deficit
4026 Bleeding reduction: Postpartum uterus	4420 Patient contracts	4976 Communication enhancement: Speech deficit
4120 Fluid management	4500 Substance use prevention	4978 Communication enhancement: Visual deficit
5645 Teaching: Infant safety 0–3 months	4512 Substance use treatment: Alcohol withdrawal	5612 Teaching: Prescribed exercise
5646 Teaching: Infant safety 4–6 months	4514 Substance use treatment: Drug withdrawal	5616 Teaching: Prescribed medication
5647 Teaching: Infant safety 7–9 months	4516 Substance use treatment: Overdose	6460 Dementia management
5648 Teaching: Infant safety 10–12 months	5020 Conflict mediation	6482 Environmental management: Comfort
5665 Teaching: Infant safety 13–18 months	5240 Counseling	6490 Fall prevention
6540 Infection control	6487 Environmental management: Violence prevention	
6680 Vital signs monitoring		
6924 Phototherapy: neonate		
6930 Postpartum care		
6960 Prenatal care		
8274 Developmental enhancement: Children		
b		
Adult Nursing Care II		Community Health Nursing
1400 Pain management		0200 Exercise promotion
1910 Acid-base management		4410 Mutual goal setting
1911 Acid-base management: Metabolic acidosis		4490 Smoking cessation assistance
1912 Acid-base management: Metabolic alkalosis		5246 Nutritional counseling
1913 Acid-base management: Respiratory acidosis		5520 Learning facilitation
1914 Acid-base management: respiratory alkalosis		5602 Teaching: Disease process
2130 Hypoglycemia management		5603 Teaching: Foot care
2260 Sedation management		5612 Teaching: Prescribed exercise
2620 Neurologic monitoring		5616 Teaching: Prescribed medication
2870 Postanesthesia care		5618 Teaching: Procedure/treatment
3200 Aspiration precautions		6490 Fall prevention
3304 Mechanical ventilation management: pneumonia prevention		6520 Health screening
3310 Mechanical ventilatory weaning		6530 Immunization/vaccination management
3350 Respiratory monitoring		6540 Infection control
3390 Ventilation assistance		6610 Risk identification
3540 Pressure ulcer prevention		7110 Family involvement promotion
4020 Bleeding reduction		7120 Family mobilization
4090 Dysrhythmia management		7910 Consultation
4120 Fluid management		8020 Multidisciplinary care conference
4180 Hypovolemia management		8500 Community health development
4200 Intravenous (IV) therapy		6490 Fall prevention
4250 Shock management		6540 Infection control
4254 Shock management: Cardiac		6550 Infection protection
4256 Shock management: Vasogenic		6610 Risk identification
4258 Shock management: Volume		7370 Discharge planning
4270 Thrombolytic therapy management		7660 Emergency cart checking
6364 Triage: Emergency center		7910 Consultation

Figures



*INT: Interventions

Fig. 1. Selected interventions.