Case Study

Integrating Simulation into Nursing Curriculum

Kempten Nursing School

Kempten, Germany

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This case study describes why and how Kempten Nursing School integrated simulation training with the curriculum and some of the benefits and challenges that have been experienced so far. The document was developed in collaboration with and approved by Kempten Nursing School.

VIDEO INSIDE

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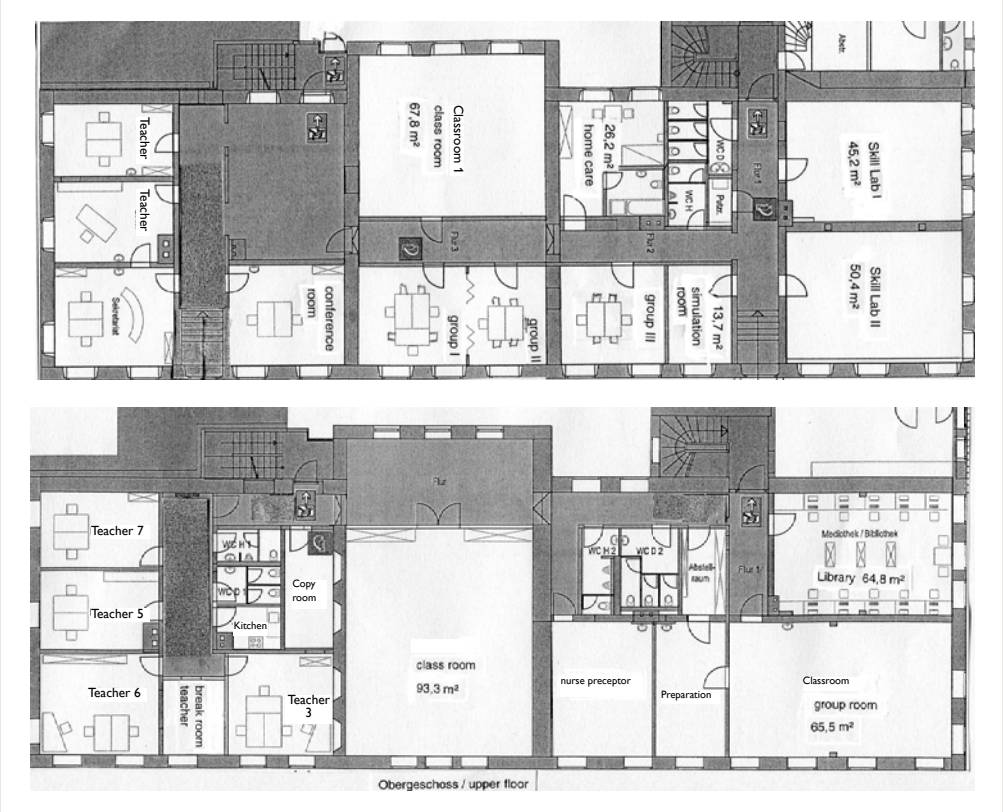
KEMPTEN NURSING SCHOOL IN SHORT

Kempten Nursing School is owned by Kempten-Oberallgãu hospital association that comprises four hospitals. The educational institution is located in Kempten, in the south-west of Bavaria, Germany and offers a three-year nursing programme. Simulation training was integrated with the curriculum in late 2009 and the new learning method is much appreciated by both faculty and the ca. 100 students attending the nursing program.[1]

Floor plan

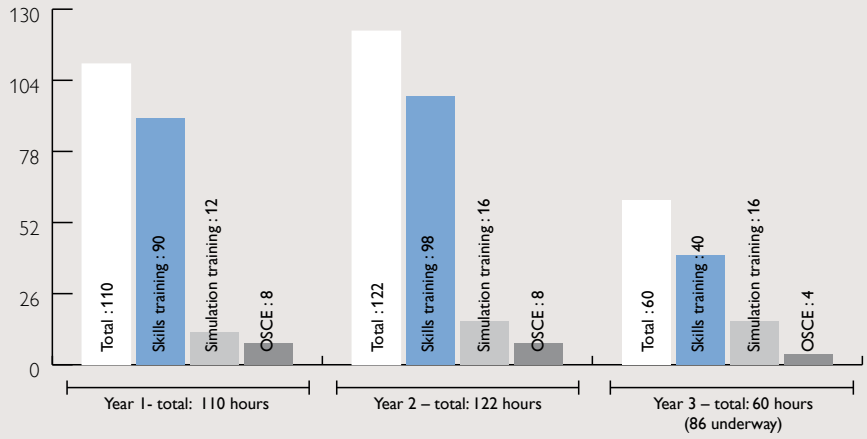


Simulation activities

Skills trainers are applied to learn and practice defined skills sets and the full size manikins and simulators are used to translate and refine the acquired knowledge and skills into clinical settings. The skills trainers and simulators are also applied to facilitate OSCE* examinations.

*An Objective Structured Clinical Examination (OSCE) is an examination designed to test clinical skills performance and competence in skills such as communication and clinical examination.

Time allocated to simulation training (hrs per year)



Website: http://www.klinikum-kempten.de

Case Study from LAERDAL

The students are more confident and much better prepared for clinical practice after Kempten Nursing School in Kempten, Germany integrated clinical skills- and full scale simulation training with the curriculum.

This case study aims to describe why the new training methods were implemented, how the training is organized, and some reflections after 18 months with simulation training.

WHY SIMULATION TRAINING?

Less clinical supervision: In their quest for cost efficiency, hospitals now instruct their employees to treat and care for larger numbers of patients with the same number of staff as before. As the nurses are more pressed for time, they become less available to their students; hence the amount of structured supervision provided by nursing staff has deteriorated in later years.

Shorter hospitalizations: Another cost-effective measure impacting students' clinical practice is an increasing use of home care and out-patient treatment. According to the Ministry of Health, an average hospitalization in 1991 lasted approximately 2 weeks, whereas the same medical conditions in 2011 merely require 6 days in the hospital (based on internal research from Klinikum Kempten).

Disadvantage: While shorter hospitalizations are a high priority, they are a disadvantage from a learning point of view in that students no longer have the opportunity to experience the full course of patients' medical recovery.

Less clinical practice time: Furthermore, in 2004 the German authorities required nursing schools to provide an additional 500 hours of theory; an initiative set forth to increase the students' knowledge levels. However, this measure resulted in equally fewer hours of clinical practice, which in turn contributed to an already worsening quality of the students' clinical placement periods. Although faculty at Kempten recognized their students' knowledge levels had improved, they also realized their clinical competencies were generally not satisfactory.

Patient safety: To compensate for an overall deteriorating quality of students' clinical practice periods and, ultimately, to increase patient safety, Kempten Nursing School decided to integrate clinical skills- and simulation training with the nursing curriculum.

FROM CLINICAL SKILLS TRAINING TO FULL SCALE SIMULATION SCENARIOS

1. Skills labs

Kempten Nursing School started the implementation by introducing skills labs in 2009. Now the students acquire and practice all mandatory skills sets here.

Advantages: Faculty are seeing that the skills labs provide better hands-on opportunities and allow students to take more responsibility for their own learning. New skills are acquired in a correct manner and the students can practice till perfection.

Learning gap: Once the various skill sets are acquired, the next step is putting them into a context, i.e. learning how to apply the skills in the delivery of patient care. However, to identify patients' needs and to act accordingly is a far more complicated learning process than merely performing various technical skills sets. It takes time, effort, and a lot of practice to master patient care, handle communication (with both patient and other team members), and to process new information, all at the same time.

Simulators bridge the gap: It is recognized that interacting with patient simulators helps the students "see the whole picture" – a prerequisite, really, to assess and fully understand a patient's needs, be able to take the necessary precautions and, ultimately, provide appropriate measures and safe patient care.

2. Interactive full scale simulation training

To facilitate this challenging and important learning process, and to deliver education based on modern learning theories and to adopt best practices from other European countries, Kempten decided to expand the skills training by combining it with interactive full scale simulation training. As a result of these new models, nursing students from Kempten are now much better prepared before entering their clinical practice periods.

Main incentives to implement simulation training:

- Increase patient safety
- Ensure that students acquire the required skills
- Prepare the students for contact with real patients
- Improve the ability of self-assessment
- Enhance exam results
- Reduce number of human factor related adverse events
- Attract more applicants and thus more competent students

HOW THE PROCESS EVOLVED

Learning in 2007 that Kempten would soon be moving to a new facility inspired staff members to come up with ideas on how to provide new and better training methods for their students. The idea of implementing skills labs was born after a Kempten employee studying educational science at Ravensburg University, Switzerland discussed the use of skills training in German nursing education with the headmaster there.

Learning from others: In 2008 headmistress Dunja Kagerman, vicarious headmistress Angelika Kirsten, prof. Winter and other core faculty members visited Careum University College in Zürich, Switzerland, as this institution had vast experience with skills labs and simulation training. Following the consultations that took place, Kempten felt assured that simulation was the right way to go to enhance their own nursing program.

The next step was to present the simulation project for the Klinikverbund Kempten-Oberallgäu (the hospital alliance comprising four different hospitals that own and partly fund Kempten Nursing School).

Getting hands-on experience: To get more familiar with how simulation training is facilitated and obtain ideas about how to implement the new training methods at Kempten, dipl. nurse educator Martina Ostheimer-Koch spent six weeks at London City University, UK to learn and draw on their experience.

Having established this link to a renowned simulation institution proved a great support when embarking on the skills training and also when moving forward with full scale simulations later on.

FINANCIAL MODEL

The funding for German nursing schools derives from three different sources:

- **Health insurance companies:** The hospital alliance (Klinikverbund) negotiates with the health insurance companies annually to settle each year's school budget (including teachers' salaries, equipment, maintenance etc.).
- **Compensation fund:** All hospitals contribute to this fund from which nursing schools receive adjustment funding.
- **Ministry of Education:** There are regional differences in Germany. Bavarian nursing schools are however allocated special funding for their educators.

To generate extra funding for their activities, Kempten rents their simulation facilities out to other educational institutions in evenings and on weekends. By approaching various local enterprises for donations the school has also obtained some additional equipment, such as wheelchairs and a bed for the 'apartment' where simulation is applied to practice home care for the elderly.

Dipl. nurse educator Martina Ostheimer-Koch visited London City University to learn more about integrating simulation training with the curriculum. To view full video: http://bit.ly/yHKWBv *or scan QR code to the right.*

Kempten Nursing School (owned by the Klinikverbund Kempten-Oberallgãu) is free to apply their resources as the school sees fit, but there is no particular budget allocated to the simulation program as such.

ORGANIZATIONAL MODEL

Who does what: The skills- and simulation project is an integral part of the nursing school and is headed by 2 core nurse lecturers. Other faculty members help develop and facilitate the simulations and skills training sessions. All 7 nurse lecturers facilitate both skills training and the full scale simulation scenarios.

Collaboration with the practice field: The school works in close collaboration with the nurse preceptors who are responsible for supervising students during their clinical placement periods in the hospital (altogether 2500 hours and equating to > 1 man-labor year). To ensure that teachers and nurse preceptors employ identical methods when demonstrating clinical skill sets, the preceptors are invited to the nursing school twice yearly to be updated on the curriculum and to familiarize themselves with further developed skills. The team also have their own office located within the school's premises.

Enhanced clinical instruction: Kempten has developed a special training course to enhance the quality of instruction in clinical practice. So far 4 nurse preceptors have attended the course.

The preceptors are employed by the hospital and work ca. 50/50 as regular ward nurses and clinical instructors, respectively. They provide individual and group instruction at the hospital, participate in the skills training at the nursing school and also contribute with developing the skills units further.

Promotes understanding: The extensive collaboration with the practice field promotes a mutual understanding of challenges associated with clinical practice and is key to solving issues that may occur along the way.

Staff

In addition to the headmistress, Kempten Nursing School employs 7 nurse teachers, 1 dipl. nurse educator (Diplom Pflegepädagogin, FH), 1 secretary and 1 nurse-educated instructor (responsible for clinical placements).

Simulation instructors:

6 nurse teachers (4 part-time)
1 dipl. nurse educator
1 wound expert

Staff competency levels

All the simulation instructors have a professional background in nursing. Six of them have continuing education as nursing teachers and one instructor is a dipl. nurse educator.

Training facilities

The 135 sq meters training facilities comprise 1 room designated to interactive simulation training, 2 rooms for clinical skills training and 1 'apartment' for elderly care.
The school administers 1 small and 2 larger classrooms for lectures, 3 rooms for student group activities, 1 library with 10 computers, 6 offices for teachers and separate chill out areas for teachers and students; altogether 1104 sq meters.

CURRICULUM

One part of the curriculum, comprising 12 different modules, is generic for all German nursing schools, while a second part is issued by the Social Ministry in each of the 16 federal states. Recently, the federal state of Bavaria issued a new, fairly strict law regarding local curricula determining which professions would be teaching the various modules (such as doctors, nurses or psychologists).

Local variations: The ordained curriculum describes the compulsory educational goals. Each school is however allowed to determine how to achieve the goals, why there are local variations in terms of developing and forming the nursing programs.

Content suitable for simulation: After it was decided to implement skills- and simulation training, Kempten had to identify the curriculum content that would be most suitable for the new learning methods. Once the appropriate curriculum was singled out, 3 core staff members started developing work books, simulation scenarios, and skills units* that would be aligned with the nursing curriculum.
The current portfolio comprises 8 different scenarios. Some of the scenarios reflect identical learning objectives but have different approaches in how to address them. Luckily the learning modules for both the skills training and the interactive simulations created in Kempten are so general, that other schools may easily adopt them. Additional scenarios will be developed in the time to come.

*All skills-units have the same design, each comprising the following learning steps:

1. Preparation
2. Basic knowledge acquisition
3. Skills analysis
4. Advanced knowledge acquisition
5. Enhanced self-training
6. Charts and reference list

EDUCATIONAL ACTIVITIES

Kempten Nursing School applies 3 out the 5 learning modalities reflected in the Circle of Learning (Figure 1). The different modalities are blended together throughout the 3-year nursing education.

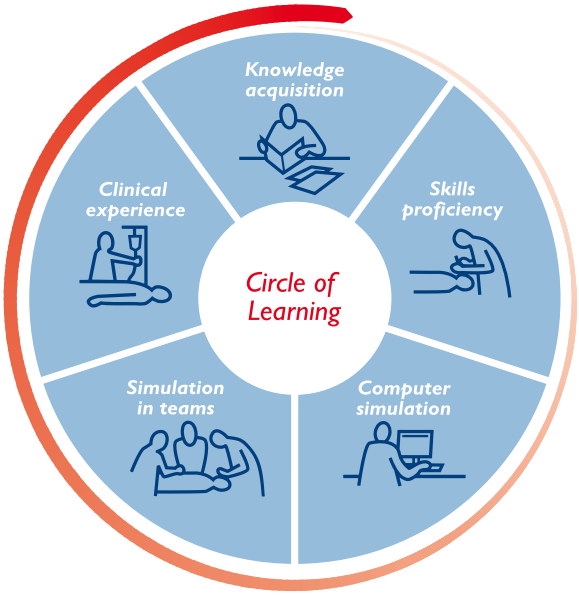


Figure 1. The Circle of Learning reflects the continuing process of attaining, enhancing and maintaining clinical competence.

What takes place where

Knowledge acquisition: The cognitive part of the curriculum is facilitated via traditional classroom lectures, reading of literature and a small portion of eLearning (presently limited to lectures on Korotkow sounds and urine catheterization).
Simulation in teams is facilitated in the rooms designated to interactive simulations.
Skills proficiency takes place in the skills labs.
Clinical experience is gained in the hospital where clinical placement periods occur at scheduled intervals.

METHODOLOGY

1. SIMULATION TRAINING

The students are divided into small groups of 3 and take turns performing the selected simulation scenario.

Two faculty members are needed to facilitate a simulation scenario:

- One teacher stays in the simulation room handling the video recording and assisting the students if needed
- The operator runs the selected scenario by managing the patient simulator's voice and vital signs and logging the students' care actions. The logs are used in the subsequent debriefing session. The operator may temporarily stop the scenario if students need further instruction or guidance by the present teacher.

Year 1, Learning objectives

Skills training

- Aseptic technique and hand disinfection
- Bed care (washing, oral care etc.)
- Vital signs (heart rate, respiratory rate, blood pressure, temperature)
- Manage sterile gloves and setting up sterile tables
- S.c. injections
- Assist with meals

Simulation training

1st scenario: Get familiar with simulation training as a learning method, practice bed care and basic communication skills.

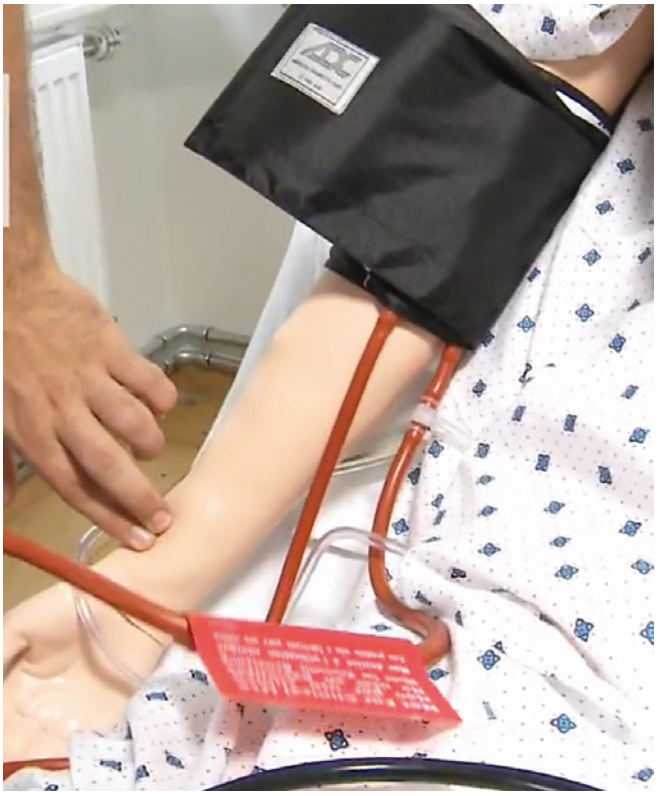
2nd scenario: Assess a post op patient with leg fracture and chronic venous insufficiency, with focus on post op care and timeliness and accuracy of care decisions (observation of vital signs, providing s.c. injections, applying pressure dressing on leg, assist with feeding and mobilization).

Basic theory, skills and simulation training: Lectures on basic knowledge around patient assessment and patient care are held in ordinary classrooms. Skills acquisition and training takes place in the skills labs and is facilitated on 5 different occasions. Teachers will either show a video or demonstrate themselves how new skills sets are correctly performed. All teachers demonstrate new skills in the same manner. Afterwards the students practice under teacher supervision.

Peer assessment: 1-3 days later the students return to the skills labs to practice more on their own. Peers will now assess each other by filling in charts to document whether procedures are demonstrated correctly. Additional training after school hours is optional. This extra training opportunity is mostly used by students who wish to self-improve following a poorly rated objective structured clinical examination (OSCE) result or after having viewed a video recording from a simulation scenario where they were not happy with their own performance. OSCE evaluations are employed on one occasion and applied to assess the following skills: the ability to prepare syringes for s.c. injection, apply compression bandages on leg, and to observe the patient's vital signs (HR, RR, BP, temperature).

The very first simulation scenario is facilitated with a standardized patient* rather than a patient simulator. Students learn the Korotkow sounds via an e-Learning platform in preparation for this session. All later scenarios are facilitated with patient simulators.

* Standardized patient: An actor playing the patient role.



A nursing student practices blood pressure and pulse assessment.

Year 2, Learning objectives

Skills training

- Urine catheter insertion and removal
- Dressing technique (aseptic and chronic wounds)
- I.m. injections
- Infusion management (peripheral and central)
- Nasogastric tube insertion and management

Simulation training

1st scenario:
Assess a patient with impaired respiration due to COPD, including auscultation of lung sounds.

2nd scenario:
Assess a postoperative patient presenting with internal hemorrhage and a low BP.

Pathophysiology and more skills: The lectures go deeper into the pathophysiology in the second year, additional clinical skills are acquired, and the performance assessments are conducted more thoroughly. A core learning objective is to select and apply appropriate skills to patients who present with medical conditions that were covered the previous year's curriculum. OSCE evaluations are employed on two occasions and applied to assess the following skills: urine catheter insertion/removal, dressing technique (aseptic and chronic wounds), administration of i.m. injections, peripheral i.v. cannula management, infusion management (peripheral and central), nasogastric tube insertion and management, wound care, use of sterile gloves and sterile tables and aseptic technique.

More challenging simulations: The students are due for two more simulation scenarios where the topics are respiration problems caused by either COPD or CHF with pulmonary edema and assessing either a post op trauma patient or a patient following a colon resection. The simulations are now more complicated. The students must demonstrate teamwork skills and the ability to self-reflect upon their care actions and overall performance, both on an individual level and as members of a team.

Nursing student inserting a nasogastric tube.

Year 3, Learning objectives

Skills training

- Blood sampling
- CVC pressure
- Oral endotracheal tube management
- Endotracheal tube suctioning
- Tracheostomy management
- ECG monitoring (planned)

Simulation training

1st scenario:
Team performance and demonstration of skills (skills to be determined).

2nd scenario:
For student evaluation purposes.

3rd scenario:
Emergency training with five different scenarios.

More theory and more complex competencies: The final year is primarily focused around theoretic knowledge. More complex skills are acquired and OSCE is applied to assess blood sampling, CVC pressure, oral endotracheal tube suction, and chest drainage management skills. An overall simulation that includes an emergency scenario completes the 3-year nursing training program.

Scenario topics: The students are exposed to interactive simulations on 3 different occasions throughout the year, all with the use of patient simulators. The scenarios range from rehab- to intensive care patients, from ER patients with serious wounds to patients dying, and from patients with a chronic illness to patients requiring emergency care.

The 1st scenario relates to team training and the demonstration of selected clinical skills.

The 2nd scenario, lasting approximately 45 minutes, is for student evaluation and takes place prior to the practical examination on the hospital ward. The students are primarily graded on patient assessment, communication and documentation skills.

The 3rd scenario is facilitated by Johanniter (local rescue service). The students rotate through 5 manned drill stations, each with a new emergency scenario that has been prepared for them.

2. DEBRIEFING

Emphasis: High
Duration: 15-40 minutes
Use of AV recordings: Yes
Teachers needed: 2

A non-judgmental atmosphere: Kempten Nursing School puts a high emphasis on the instructor-led debriefing sessions that follow each simulation scenario. Faculty members have been trying out slightly different methods in trying to find the most efficacious way to facilitate debriefing and they are still gaining experience. As simulation training was only recently implemented (2009) debriefing techniques for students in their final year are currently under development. Regardless methodology the ambition is the same; discuss what went well and what could be improved upon in a nonjudgmental fashion.

Main focus year 1: Basic clinical skills

Debriefing after the 1st scenario: Each student takes home a filled in evaluation form and a copy of the video that was recorded during the simulation scenario. Following a period of self-reflection the students make individual appointments with the teacher. Here they will watch the video together and have a 15-50 minute discussion afterwards.

Debriefing after the 2nd scenario: The students have worked in teams during this simulation and will subsequently also debrief in teams. The session starts with 5 minutes of self-reflection right after the scenario is completed, followed by instructor-led group discussions of 15-50 minutes.

Main focus year 2: Teamwork performance

Debriefings after the 1st and 2nd scenarios: The teacher-facilitated group debriefings last around 5 minutes and take place in the simulation room. Afterwards the students receive a blank evaluation form for optional self-reflection. Individual debriefing is usually facilitated the same day.

Main focus year 3 (in progress):

Situation analysis, selection and evaluation of appropriate action strategies.

REFLECTIONS AFTER 18 MONTHS

"I have never worked so hard – but never had so much fun."

Vicarious headmistress and nurse teacher Angelika Kirsten

On identified benefits

"Simulation training is considered a highly motivating factor for faculty. We learn something new every day and, rather than being traditional teachers, we perceive ourselves as the students' partners."

"While in clinical practice, students risk not being exposed to skill sets they are required to learn. Now we can ascertain that they acquire all the skills listed in the curriculum."

"Having the skills in place makes the students feel more confident in clinical practice. Feeling safer and having guidelines on how to learn helps them focus more on the patient."

"Because the students are now trained to explain the background for the measures they take, they have more knowledge about what they are doing, which in turn makes it easier to transfer acquired skills and competencies to clinical practice."

"We are seeing a new generation of students now. They have started asking more questions about what they do and are increasingly applying critical thinking while in clinical practice."

"Now they assess patients in a more structured manner before calling the doctor."

"When a student fails an OSCE concerning a particular skill or competence, we notify the appropriate ward staff that the student in question needs more supervision and is not allowed to work independently until the OSCE is passed."

"Peer assessment is widely used by the students and it increases their learning outcomes."

"Having developed more uniform requirements for the acquisition of clinical skills has helped us instruct the skills in the very same manner; hence our staff have identical expectations with regards to student performance. Along with our uniformed assessment profiles, the grading has become easier for us and more fair to the students."

"Video documentation makes feedback on performance more comprehensible."

"Following the implementation we expect applications from students with higher education levels."

On sharing experiences

'We take every opportunity we can get to promote our strategy to colleagues at other nursing schools, as the benefits we are experiencing with simulation training are very encouraging. By showing how simulation has been integrated with our own curriculum and what we have accomplished so far, we are hoping that more schools will embark on a similar project."

On identified challenges

"The preparing beforehand was time consuming, especially since we were only two colleagues developing the new student work books we use for skills acquisition. This project continues and is still a lot of work, but it is much more manageable now that all faculty contribute. Our work books are fairly generic and we hope that by publishing them, other German nursing schools will get an easier start."

"Transitioning from the old to the new nurse educator role has been challenging faculty wise in that simulations require more staff than the traditional classroom instruction. The staff shortage means each faculty member needs to work more."

On identified success factors

"A supportive and motivated headmistress has proved important. To help us get started she contacted the Kempten-Oberallgau hospital alliance (owner of Kempten Nursing School) about permission to implement new and innovate learning methods. She has also been helpful in applying for funding."

"The ability to see opportunities."

"Having motivated colleagues makes a huge difference and is crucial to a successful implementation."

TRAINING SOLUTION

The training equipment currently includes:

Simulators:
1 SimMan 3G (allocated by the University of Ravensburg)

Manikins:
1 Laerdal Nursing Anne
1 Laerdal VitalSim*
3 full size manikins (brand unknown)

Skills Trainers:
1 IV arm
1 attachable pad for colostomy care
10 attachable pads for different types of wound care
Birthing trainer.

* VitalSim simulates ECG, heart sounds, fetal heart sounds, breath sounds, bowel sounds, blood pressure and pulses.

SIMULATION ACTIVITY

Kempten Nursing School has an annual intake of 33 nursing students hence 99 attending students at all times. The amount of time allocated to simulation training amounts to 228 hours of skills training in the skills labs and 44 hours of interactive simulation training throughout the three-year study period (further details provided on page 2).

WHAT MAKES GOOD SIMULATION PROGRAMS

In 2005 Issenberg et al[2] reviewed and synthesized existing evidence in educational science that addressed the following question: What are the features and uses of high-fidelity medical simulations that lead to most effective learning?

Issenberg found that the weight of the best available evidence suggests that high-fidelity medical simulations does facilitate learning, when training is conducted under the "right conditions."

Right conditions:

- Feedback is provided during the learning experience
- Learners engage in repetitive practice
- Simulation is integrated into the normal training schedule
- Learners practice with increasing levels of difficulty
- Simulation training is adapted to multiple learning strategies
- A wide variety of clinical conditions are provided
- Learning on the simulator occurs in a controlled environment
- Individualized learning with reproducible, standardized educational experiences is provided
- Learning outcomes are clearly defined
- Ensuring the simulator is a valid learning tool

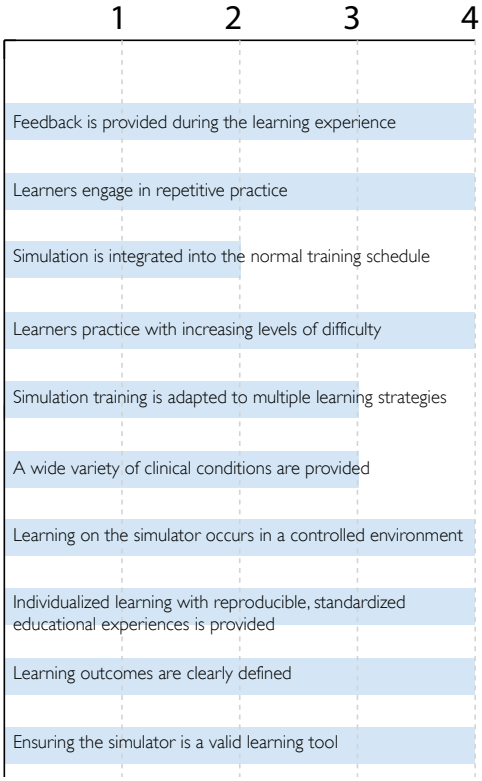


Figure 2. The rows indicate to what degree Kempten Nursing School delivers on each of the 'right conditions' as assessed by the vocational school on a 4-point Likert scale.

Although *Providing feedback* is considered the most crucial feature for their simulation based learning, Kempten indicates that it is more about the combination of factors that matters, as they are all important.

FIVE YEARS FROM NOW

- Kempten Nursing School is one of the most innovative educational institutions in Bavaria
- The simulation project is evaluated
- eLearning is further developed and more thoroughly integrated with the curriculum
- Pedagogy students from the university come to Kempten Nursing School to learn about simulation training
- One clinical practice day per semester is replaced by simulation training
- Simulation is the platform for theoretical knowledge acquisition, supported by PBL.
- Professional nurse anesthetists and medical students participate in selected simulations

REFERENCES

1. Kempten Nursing School (Klinikverbund Kempten-Oberallgäu): http://www.klinikum-kempten.de
2. Barry Issenberg et al. (2005) Features and uses of high fidelity medical simulations that lead to effective learning: a BEME systematic review, Medical Teacher, Vol. 27, NO.1, pp. 10-28.

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