



**Karolinska  
Institutet**

**Institutionen för klinisk vetenskap, intervention och teknik**

**Enheten för anestesi**

# Team work training using patient simulation

**AKADEMISK AVHANDLING**

som för avläggande av medicine doktorsexamen vid Karolinska  
Institutet offentligen försvaras på engelska språket i Föreläsningssal  
221, Alfred Nobels Allé 12, Karolinska Institutet Huddinge

**Fredagen den 31 maj 2013, kl. 08.00**

av

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**Stockholm 2013**

## ABSTRACT

Teamwork is an important factor in safe healthcare. Simulation based team training (SBTT) is a method to gain the non-technical skills important for proficient teamwork. This thesis evaluated SBTT using different modalities and evaluation levels, looking at *whole* teams of either medical students or full professionals.

*In study I* 15 medical students participated in a target-focused scenario-based teamwork practice during a one-day course. Their team behaviour skills were video-recorded and their attitudes towards safe teamwork assessed in this observational cohort study. Team behaviour skills showed improvement after five scenarios in a full-scale patient simulator environment, while no change in attitudes toward safe teamwork were detected.

*In study II* 54 medical students participated in three video-recorded scenarios (n=36). Clinical performance improved in one variable; the frequency of sum-ups. Changes in individual experiences could be detected early during SBTT; self-efficacy improved after training. Individual teamwork behaviours did not change after this half-day course. Participants communicated to a greater extent and experienced higher mental strain and concentration in the role of leader than in the role of follower.

*Study III* investigated whether training with high-fidelity simulators (HFS) could increase trainees' experience of realism in task performance and facilitate the trainers' task, resulting in different behaviour and individual experiences than training with low-fidelity models (LFM). A case control study was conducted with 34 teams using either a LFM (n=17) or a HFS (n=17). Professionals involved in paediatric emergencies performed one video-recorded emergency scenario *in situ* in an authentic emergency room. The trainees' time to deliver oxygen was significantly longer (p=0.014) when using a HFS, which was interpreted as more realistic timing of task performance. Leaders experienced a higher level of mental strain during training with a HFS. There was a reduction in the trainers' frequency of interventions in the scenarios as well as their mental strain, signifying potential for the trainers to focus more on trainees' behaviours and performance during training using a HFS.

*In study IV* all staff members (n=152) in an intensive care unit (ICU) were trained during one day. An observational cohort study (case control design on sick leave and staff turnover) was conducted. The training was performed *in situ* at the ICU and preceded by an interactive lecture concerning human factors. Before training, the medical professions' perceptions of safety differed. After the training period, nurses' and physicians' mean self-efficacy scores improved, and nurse assistants' perceived that the quality of collaboration and communication with physician specialists improved. In addition, nurse assistants' perception of the Safety Attitude Questionnaire (SAQ) factors teamwork climate, safety climate and working conditions were more positive after the project and in concert with nurses' perception of safety climate. In comparison to a control ICU during the study period, the number of nurses quitting their job and nurse assistants' time on sick leave was reduced.

*In conclusion*, the SBTT protocols applied in these studies are promising. A one-day course seems to benefit medical students' teamwork behaviour. During a half-day course, i.e. early phase of training, aspects of clinical performance were improved as well as self-efficacy. Equipment fidelity influenced trainees' clinical performance to some extent, but the trainers' performance and experience to a larger extent. Leaders, followers and the different medical professions reported different experiences and attitudes. This finding accords with earlier studies on professions but has not been well studied earlier in the context of leaders and followers. All professions benefited from one day of SBTT in an ICU, but it was expressed in different ways.