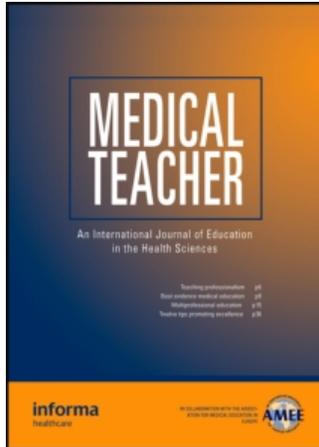


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Integration of role-playing into technical skills training: a randomized controlled trial

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Abstract

Introduction: Recently, efforts have been undertaken to enhance the face validity of technical skills training by introducing role-plays and standardised patients. Since little is known about the effects of role-playing with respect to the realism of a training situation and students' objective performance, we performed a randomized controlled trial.

Methods: 36 medical students participated in videotaped small group skills-lab sessions on the topics of Doppler sonography and gastric tube insertion. One half of the students participated in role-plays and the other half practised without role-playing. Realism of the training situation was analysed by means of post-intervention self-selected student survey evaluations. Technical performance and patient-physician communication were assessed by independent ratings of the videotaped sessions.

Results: The physician's role was regarded to be significantly more realistic when performing role-plays. Assessment of videotaped sessions showed that practising technical skills by performing role-plays resulted in significantly better patient-physician communication whereas students' technical performance did not differ between groups.

Conclusion: Introducing role-plays enhances the realism of technical skills training and leads to better patient-physician communication. Students do not seem to be overstrained by practising clinical technical skills using role-plays. We conclude that role-playing is a valuable method in practising technical skills.

Introduction

Basic technical skills and communication skills are essential components of a physicians' clinical competence. Traditionally, skills training has focused solely on technical expertise, ignoring other key competencies such as professionalism and communication skills, despite the fact that clinical procedures require the integration of both technical and communication skills (Dacre et al. 1996; Kneebone et al. 2002). Innovative and emerging teaching strategies such as simulation centres and training with standardised patients have begun to address these limitations (Ziv et al. 2005). However, these approaches are not only costly, but also require considerable resources and expertise. The role-playing approach described in the current study is a low-tech simulation technique that is scaleable to a variety of settings and a large number of students (Miller 1987; Ziv 2005).

In teaching communication skills, the use of student role-playing (Simpson 1985) and standardised patients (Barrows 1993) are very common. Although skills integration, which enjoys a long tradition in the US, is richly and substantially dealt with in the literature, efforts have only recently been made to transfer these methods to technical skills training in order to include communicational aspects. These integrational efforts have enhanced the face validity of technical skills training (Kneebone et al. 2002; Nikendei et al. 2005).

Practice points

- Basic technical skills and communication skills are essential components of physicians' clinical competence. These skills can be effectively taught in skills-labs.
- The integration of role-playing into technical skills training results in a significantly higher realism of the physician's role when practising with both fellow students and with manikins.
- Furthermore, role-playing results in significantly better communication and patient-physician interaction during the sessions.
- Technical performance is not impaired by role-playing with a focus on technical as well as communication skills.
- Role-playing should be an integral part of technical skills training promoting a joint focus on accompanying communication requirements. There is a need for research to elucidate the effects of simulation at different levels of fidelity.

Kneebone et al. (2002) demonstrated the feasibility of integrating standardized patients into technical skills training in the context of surgical clinical scenarios which were

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supervised by both a communication and a technical skills tutor. Qualitative results from group interviews showed that the students considered it a valuable and challenging learning experience, integrating communicational aspects into surgical skills training. In an earlier study, we integrated student role-plays into internal medicine technical skills training (Nikendei et al. 2005). Participants assumed the role of 'physician', 'patient', or 'supervizing colleague' and case studies provided important basic information for the simulated clinical scenario. The 'physician' obtained peer feedback on technical as well as communication performance based on a predefined checklist. Sessions involving role-playing were rated significantly higher than sessions without the intervention, although it should be noted that the topics of sessions with and without role-playing were not identical.

In the literature, a demand is made for the development of expertise in multisimulation scenarios and the combination of simulation modalities in order to enhance the realism and effectiveness of training (Ziv et al. 2005). Yet, very little is known about the impact of role-playing on technical skills training or whether the additional focus on patient-physician interaction results in an impairment of technical skills performance. On the basis of definitions provided in the literature, according to which role-playing comprises three phases: preparation, interaction and discussion (Simpson 1985; Yardley-Matwiejczuk 1997), we decided to compare role-playing with the sole practising of individual skills. The aim of the present study was to investigate (1) students' perceptions of the relevance of roles played and the reported degree of reality, (2) an objective measurement of verbal and procedural performance during the sessions and (3) the impact of different learning scenarios (training with fellow student versus training with mannequin) on these variables. Since role-playing defines roles and circumstances of the training scenario, focuses on patient-physician interaction and provides role-players with respective feedback (Simpson 1985; Yardley-Matwiejczuk 1997), we expected role-playing (i) to enhance the degree of realism of the training situation, in particular when training with a fellow student, (ii) to result in improved patient-physician communication and interaction and (iii) not to impair technical skills performance.

Methods

Participants and tutors

36 third year undergraduate medical students were included in the study. The participants were recruited through advertisements. Inclusion criteria were as follows: currently in third year of medical training, provision of written informed consent and native speaker of the German language. Participants were matched for gender and age and randomly assigned to either the intervention group (IG) or the control group (CG). Each group comprised 18 students. In line with a role-playing approach which has been shown to be feasible in training technical skills (Nikendei et al. 2005), students were then divided into small groups of three. Finally, each condition (IG and CG) comprised 6 small groups. The small groups were

alternately taught by one of two tutors, both of whom trained technical and communication skills and both of whom were experienced physicians in the field of general internal medicine. Participants each received 30€ for participation.

The setting

The study took place in the two skills-labs at the University of Heidelberg Medical Hospital. Both skills-labs are equipped with remote-controlled, ceiling-mounted video cameras for the recording of training sessions.

Design and procedure of skills-lab sessions

Doppler sonography of leg arteries and gastric tube insertion were selected as procedures to be performed in the skills-lab sessions on account of the fact that they represent two frequently needed skills. Students practiced Doppler sonography on one another, whereas gastric tube insertion was practised using a basic plastic mannequin. Procedures were practised within the predefined small groups and alternately run by one of the tutors according to the study plan. The design of the skills-lab sessions is presented in Table 1. Participants were introduced to the technical procedure using videos, which resembled the ensuing training situation as closely as possible. Subsequently, brief information about the skills to be acquired was provided. The IG group was then instructed as follows (c.p. Nikendei et al. 2005): Students were asked to assume the various roles of 'physician', 'patient' or 'supervising colleague'. Three case studies on Doppler sonography and three on gastric tube insertion served as clinical scenarios for the training and were read aloud before the role-plays commenced. After one student had acted as

Table 1. Design of skills-lab session.

Skills-lab session	Duration
Welcoming of students to the skills-lab	5'
Basic information about the study	10'
<i>Evaluation I</i>	5'
Video Doppler sonography	5'
Brief information about Doppler sonography	10'
Introduction to role-playing ¹ /instructions for exercise ^{1,2}	5'
Exercise Doppler-sonography with tutor feedback ^{1,2} (and peer feedback ¹)	30'
<i>Evaluation II</i>	5'
Video gastric tube application	5'
Brief information about gastric tube application	10'
Introduction to role-playing ¹ /instructions for exercise ^{1,2}	5'
Exercise gastric tube application with tutor feedback ^{1,2} (and peer feedback ¹)	30'
<i>Evaluation III</i>	5'
End of session	2'

¹Intervention group (IG) with role-playing. ²Control group (CG) without role-playing.

physician in the clinical scenario, the student assigned as supervising colleague provided feedback on the physician's technical and communication performance based on a pre-defined checklist. During the session, each student undertook each of the three given roles. The CG practised without preset clinical scenarios, role-playing or peer feedback. Tutor feedback was finally provided for both the IG and the CG. All IG and CG sessions were videotaped. A pilot study was conducted with 18 participants in order to test the experimental approach and calculate the number of students required.

Evaluation instruments

Basic data including former experiences of role-playing and theatre acting, as well as clinical experience and experience of the skills to be learned were collected by questionnaire (evaluation I, see Table 1). Realism, relevance of the roles (physician, patient, supervising colleague) and scenario realism were evaluated on a Likert-scale ranging from 1 (very low) to 6 (very high) for both clinical procedures separately (evaluation II and III, see Table 1). The importance of the role of the patient and the role of the supervising colleague could only be rated by the IG.

The videotaped sessions were edited to ensure that the different instructions for IG and CG were not visible to the raters. Following editing, the sessions were randomly presented and independently rated by two tutors of communication and technical skills. A traditional binary checklist was used to evaluate students' technical skills performance (cp. Regehr et al. 1998). Communication skills performance was assessed using a global rating scale which comprised the four process-related subscales empathy, coherence, verbal expression and non-verbal communication (McIlroy et al. 2002).

Statistical analysis

Data resulting from the evaluative instruments administered to participating students are summarized as mean \pm SD. In order to test for significant differences between means, a two-sample t-test was carried out. A p -value of $p < 0.05$ was considered to be statistically significant.

Results

Sample

36 third year medical students (8 male, 28 female) participated in the training. The mean age of the students was 23.4 years for

the IG and 22.3 years for the CG. IG and CG did not differ with respect to experience with role-playing, theatre acting, number of weeks in clerkships or self-assessed experience in the skills to be learned. There was no difference between IG and CG in experience in performing the skills to be learned.

Rating of didactic aspects

Ratings of the realism of the training situation and the realism of the physician's role are shown in Table 2. The realism of the training situation proved significantly higher for Doppler sonography as compared with gastric tube insertion (3.97 ± 0.85 vs. 3.36 ± 0.96 ; $p = 0.001$) for all participants. Realism of the physician's role proved significantly higher in the IG as compared with the CG for both practised skills. Within the IG, the relevance of the role of the patients was rated at 4.50 ± 1.04 for Doppler sonography; the relevance of the role of the supervising colleague was also rated highly at 3.39 ± 1.58 for Doppler sonography and 3.72 ± 1.49 for gastric tube insertion.

Video rating

Results of the independent rating of technical and communication performance are presented in Table 3. Communication and patient-physician interaction were rated significantly better in the IG, while students' technical performance did not differ between groups. The inter-rater reliability between the two raters amounted to 0.78 for technical skills ($p < 0.01$) and 0.82 for communication skills ($p < 0.01$).

Discussion

The present study examined the impact of the introduction of role-plays into technical skills training in a randomised controlled trial based on two clinical procedures; the first including a Doppler sonographic examination of fellow students, and the second integrating a mannequin for the training of gastric tube insertion. In general, the training using fellow students was considered more realistic than the work with the mannequin. Further results revealed that the realism of the physicians' role was significantly higher for both scenarios when role-playing was incorporated. Communication and physician-patient interaction were rated significantly higher by independent raters of the videotaped sessions when skills were practised using role-playing.

Table 2. Evaluation of skills-lab session on a Likert-scale ranging from 1 (very low) to 6 (very high): mean, standard deviation and p -value.

Didactic aspect	Doppler sonography			Gastric tube application		
	IG (SD)	CG (SD)	p	IG (SD)	CG (SD)	p
Realism of training situation	4.11 (± 0.68)	3.83 (± 0.99)	<0.331	3.61 (± 0.70)	3.11 (± 1.13)	<0.120
Realism of physician's role	4.22 (± 0.73)	3.56 (± 0.70)	<0.009	4.11 (± 0.68)	3.17 (± 0.92)	<0.001

IG = intervention group with role-playing. CG = control group without role-playing.

Table 3. Objective clinical competence: video rating of communication skills (global rating: 0–24) and video rating of technical skills (checklist rating: % of achievable items).

Video rating	Doppler sonography			Gastric tube application		
	IG (SD)	CG (SD)	<i>p</i>	IG (SD)	CG (SD)	<i>p</i>
Global rating communication skills	1.78 (±0.52)	4.01 (±0.67)	<0.001	1.80 (±0.60)	4.50 (±0.50)	<0.001
Checklist rating procedural skills [%]	92.6 (±11.6)	96.9 (±5.1)	<0.157	86.8 (±12.6)	84.5 (±6.4)	<0.492

IG = intervention group with role-playing. CG = control group without role-playing.

Objective technical performance assessed by independent raters was, however, the same in both groups.

We conclude that combining clinical technical skills training with role-playing does not overburden students. Indeed, combined training led to a significant improvement of patient-physician interaction compared to training without role-playing. The setting and training situation proved to be adequate and valuable for third year medical students. In our opinion, these findings should encourage tutors to combine the training of clinical technical skills with role-playing. Since role-playing is easy to integrate, it should become an integral part of technical skills training promoting a joint focus on technical skills as well as accompanying communication requirements. Such training might guarantee improved patient-physician interaction during the later performance of clinical technical skills in real life settings.

The feasibility of integrating role-plays into technical skills training has already been demonstrated (Nikendei et al. 2005). Here, it was shown that sessions with role-playing were rated significantly better than those without role-playing. Results of the present study support the hypothesis that role-playing produces a higher level of realism and enhances face validity. While role-playing is easy to integrate, the concept of integrating standardized patients as proposed by Kneebone et al. (2002) requires additional resources.

Role-playing carries further advantages in so far as it comprises three phases: preparation, interaction and discussion (Simpson 1985; Yardley-Matwiejczuk 1997). Instructions for role-playing define the training scenario and stimulate students to 'buy into' the different roles during the interaction, allowing all students to get involved and therefore supporting contextual learning (Nestel & Tierney 2007). Assuming the role of a patient for example, was regarded by participants to be particularly valuable. In this case, role-playing allows students to gain patient insights, reflect upon patient's perspectives and to offer their introspection in their subsequent feedback. From an interactive perspective, role-playing focuses on interaction of participants and comprises advantages similar to those contained in other simulation methods, creating a safe zone where risk-free training becomes possible (c.p. Kneebone 2003). In the 'discussion' following the role-play, peer feedback and tutor feedback played an important role. In our study, feedback was provided on the basis of the predefined checklist following the observation of and reflection on fellow students' technical and communication performance. It is well-known that the practice of immediate feedback is of high learning value and that it plays an important role in learning

clinical procedures (e.g. Tolan & Lendrum 1995; Ziv et al. 2005).

Limitations

The study was conducted with a limited number of participants. In order to avoid a tutor bias, both tutors taught the same number of small groups from the intervention group and the control group. Participants were carefully matched for gender and age and did not differ with respect to experience with role-playing, theatre acting, number of weeks in clerkships or self-assessed experience in the skills to be learned. However, the study was not based on a pre-post-design in which assessment took place prior to and following the two teaching interventions and also was not conducted using a double blind method. Further research should address these issues and results should be validated in a real life-setting.

Conclusion

The integration of role-plays into technical skills training induces a significantly higher level of realism in terms of the physician's role, both when practising with fellow students and with mannequins, and does not overburden students. Furthermore, role-playing results in significantly better communication and improved patient-physician interaction during the sessions and proves to be an appropriate teaching tool for use with medical students.

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