Association for Surgical Education

Teaching communication skills using the integrated procedural performance instrument (IPPI): A randomized controlled trial

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Abstract

BACKGROUND: The Integrated Procedural Performance Instrument (IPPI) uses various bench-top models positioned to standardized patients (SP) to recreate realistic clinical encounters. This study assessed the effectiveness of using an IPPI format as a teaching tool for communication skills.

METHOD: Thirty-two participants underwent 2 videotaped IPPI scenarios before randomization into 2 groups—experimental (SP-led feedback) or control (no feedback). Participants then completed 2 further IPPI format scenarios. Videotapes were scored by 2 blinded independent raters using validated assessment scales (communication and technical).

RESULTS: The experimental group performed significantly better on the communication scores following feedback compared with the control group (mean 77% vs 66%, P < .05). No difference in scores for technical skills post-intervention were demonstrated (checklist: experimental mean = 64% vs control = 59%, P = .40; global ratings: experimental mean = 66% vs no control = 62%, P = .37).

CONCLUSIONS: The IPPI is an effective tool for teaching communication skills in residents and medical students and should be considered for incorporation into undergraduate and surgical curricula.

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KEYWORDS: Teaching; Formative assessment; Communication skill; Technical skill

Surgeons are required to be good communicators.1 They need to ensure that patients have all necessary information about their condition and identify and address their patients’ concerns. Surgeons also need to be good listeners and show high levels of interpersonal skill.2 They have to read non-verbal cues of patients—the cues of anxiety, uncertainty, or anger—and what they are not saying and why. If these cues are not read, the patient is left with an unsatisfying experience and the surgeon has not achieved what was intended. Communication and interpersonal challenges in the medical setting are first introduced to future surgeons when they are medical students. This continues throughout surgical residency. Residents communicate daily with patients, often while they are performing a procedure on them. Whether the resident is on the surgical ward inserting a urinary catheter or in the emergency room suturing a wound, the technical component of the procedure is combined with a communication and interpersonal challenge.
In the core curriculum, many basic technical skills are taught in the skills laboratory, removed from patient interaction and, therefore, out of context. According to the cognitive psychology literature, learning is most efficient when done under contextually relevant situations. Aside from this, separating technical from communication skills may be sending an erroneous message to trainees that technical skills are of higher value than communication skills and that these skills do not need to be integrated. There is a relatively small window of opportunity to teach these valuable skills before the resident is exposed to potential negative learning experiences through poor role modeling in the so-called hidden curriculum. Therefore, residency programs should take a proactive approach to teaching these skills.

Kneebone et al, through the development of an innovative tool—the Integrated Procedural Performance Instrument (IPPI)—have provided a means for combining technical challenge with communication challenge in various clinical contexts using standardized patients. Each clinical scenario uses a bench-top model (necessary for the technical skill) placed on a fully briefed standardized patient (SP) to simulate the realistic clinical setting. Skills required to deal with the anxious, confused, or angry patient can be practiced in “safe” settings with feedback obtained from various sources (the SP, supervisors, other residents). Importantly, the encounter can be videotaped allowing for immediate debriefing and feedback. Prior to implementing the IPPI in undergraduate medical or surgical curricula, its effectiveness as a teaching tool needs evaluation.

The primary goal of this study was to determine whether immediate feedback on communication and interpersonal skills in videotaped IPPI scenarios would lead to improvements of these skills in further IPPI scenarios. The secondary goal of this study was to assess whether any improvements in communication skills occurred at the expense of the participants’ technical skills. Because of the need for participants to dual-task, we wanted to evaluate the effect that this communication challenge and teaching had on participants’ technical performance in the experimental group.

Methods

Participants

Participants included 16 fourth-year medical students and 16 junior surgical residents at the end of their first postgraduate year at a large Canadian university. They were recruited to participate in this study on a voluntary basis and received an honorarium for their time commitments. Ethics approval was obtained from both university and hospital research ethics boards.

Experimental design

Participants were randomized into 2 groups—experimental (feedback) and control (no feedback)—before commencement of the IPPI scenarios on the day they presented for the study. Participants were stratified according to their level of training (medical student or surgical resident) before randomization to ensure an equal distribution to both groups. Results of the differences between levels of training will be published in a follow-up study evaluating the construct validity and psychometric properties of IPPI as an evaluation tool. All participants were involved in 2 videotaped IPPI scenarios (details below). Feedback was SP-led and involved review of videotaped performances for up to 30 minutes. All participants completed 2 post-intervention videotaped IPPI scenarios (details below). To capture performance of their technical as well as their communication skills, 2 videos were used for each scenario—1 close-up and focused on the technical component and the other wide-angled and focused on the interaction between participant and SP.

IPPI scenarios

Pre-intervention scenarios. All participants completed both scenarios.

Wound closure. A simulated skin pad (used for bench top. work) was attached to an SP’s right upper arm (Figure 1). The arm was then draped, exposing only the laceration. The SP was to behave as though she was mildly intoxicated and anxious about being within a hospital environment. The scenario was outlined and the participants were instructed to close the wound using interrupted 3/0 silk sutures and to deal with any patient concerns.

Urinary catheterization. The urinary catheterization anatomical model was placed on a clinical bed. The SP was seated at the head of the bed, leaning back with his legs under the table. Both the SP and the bench-top model were draped to create the appearance of a man lying on the bed. The SP was to behave as though he was anxious and uncomfortable with the clinical procedure. The scenario was outlined and the participant was instructed to insert a
urinary catheter into this postoperative patient in acute urinary retention and deal with any patient concerns.

**Post-intervention scenarios**

All participants completed both scenarios.

**Application of a cast.** A SP had a severe wrist sprain and presented to the emergency room. She was to behave in an irritated manner for being told to keep her hand immobile while she waited for nearly 2 hours for splinting. The participants were instructed to place the patient in a volar splint (immobilizing the wrist joint with a plaster slab) and to deal with any patient concerns.

**Skin lesion removal station.** A skin pad containing a simulated mole was placed on an SP's lower arm. The SP was to portray a patient who was congenitally blind (which was not to be revealed if the participant did not recognize it.) She wore dark glasses and had a white cane leaning on the wall beside her. She was worried that the mole was cancerous. The participants were instructed to remove the lesion on the skin under local anesthetic, to close the wound and deal with any patient concerns.

**Standardized patient training**

The SPs were trained before the commencement of the study. They were told what to expect from a technical viewpoint and notified of potential differences in skill level between participants. They were able to familiarize themselves with the bench-top models and were shown videos of similar scenarios performed at Imperial College London. For each scenario, they were given a character description including name, age, behavior, affect, mannerisms, questions and prompts, history of present illness, past medical history, social history, and family history. For consistency, the same SP was used for each scenario in all study sessions. SPs who delivered feedback were not involved in the post-intervention IPPI scenarios. All SPs in this study had previously been trained by the Toronto SP Program (SPP) in providing feedback for communication and interpersonal related issues they were experienced in using the global rating form as a framework for the feedback process and were selected based on their ability.

**Outcome measures**

The participants' technical skills were assessed using previously validated assessment scales—a task specific 26-item checklist and a 5-item (each item anchored by 5-point behavioral descriptors) global rating scale (GRS). Communication and interpersonal skills were assessed using a previously validated global 5-item scale that divides the skills into overall communication ability and 4 components: empathy, coherence, verbal, and nonverbal expression. Each category is anchored by 5-point behavioral descriptors. Each scenario was videotaped to enable assessment of both technical and communication skills at a later date by 2 expert surgeons blinded to the participants' level of training and group assignment.

**Feedback sessions**

Immediately after each interaction with the participant, the SP completed the validated communication assessment form (same as that used by the blinded raters) and wrote notes relevant to issues of communication. After the first 2 IPPI scenarios, those participants randomized to the experimental group met with the involved SP to receive structured feedback. The SP and participant met in a private area with a television monitor and discussed the interaction referring to the tape when necessary (Figure 2). Each feedback session lasted 15 minutes. Across the 2 scenarios, therefore, the total duration of feedback and discussion was 30 minutes. Participants then completed the 2 post-intervention scenarios.

**Data analysis**

Communication scores were submitted to a mixed-design analysis of variance (ANOVA), with feedback (no feedback, feedback) and level of training (residents, medical students) as between-subjects variables and scenario (urinary catheterization, wound closure, cast, skin lesion) and item (overall, empathy, coherence, verbal, nonverbal) as a repeated measure. To determine the level of inter-rater reliability of the IPPI format examination, the interclass correlations coefficient were calculated for the checklist, the GRS, and the communications scales.

Expert scores on the technical (checklists and global ratings) scales were submitted to separate mixed-design analyses of variance with task (urinary catheterization, wound closure, cast, skin lesion) and level (overall, empathy, coherence, verbal, nonverbal) as a repeated measure. To determine the level of inter-rater reliability of the IPPI format examination, the interclass correlations coefficient were calculated for the checklist, the GRS, and the communications scales.

Expert scores on the technical (checklists and global ratings) scales were submitted to separate mixed-design analyses of variance with task (urinary catheterization, wound closure, cast, skin lesion) and level (residents, students) and group (no feedback, feedback) as the between-subject variables.
Results

Communication scores

Overall ANOVA results with 4 scenarios (2 pre- and 2 post-interventions) are shown in Table 1. There was a significant interaction between group and scenarios (pre- and post-feedback; P < .05) demonstrating that in the post-intervention scenarios, the experimental group that received feedback outperformed the control group that did not receive feedback. Figure 3 demonstrates that, before intervention, there were no differences between communication scores of the 2 groups (experimental vs control) indicating that the randomization process was effective. Figure 4 demonstrates that communication scores within each subcategory of the communication on post-intervention scenarios were significantly higher for participants who received feedback than for those who did not receive feedback. Participants in the feedback group outperformed the control group on every item of the communication scale—overall score, empathy, coherence, verbal, and nonverbal expression—in the 2 IPPI scenarios following intervention. These results were confirmed by separate mixed-design ANOVAs conducted on pre- and post-intervention scenarios. For the pre-intervention scenarios, there was no significant effect of feedback (P = .75, Table 2). For the 2 post-intervention scenarios, there was a significant main effect of feedback (P < .05, Table 3).

Effect of communication feedback on technical performance

The results of the anova on the participants’ technical performance (GRS and the checklist scores) indicate that there was no significant difference between the experimental group and the control group for any of the scenarios (Figures 5 and 6).

Comments

In this study, it was demonstrated that a brief exposure to SP feedback on communication and interpersonal skills led to a significantly better performance in all subscales in communication performance than those receiving no feedback. There were no other significant interactions when all variables were entered into an ANOVA (Table 2). Importantly, the enhanced communication performance did not appear to be at the expense of technical performance. This study is encouraging as it demonstrates that even after a very brief interaction with a trained SP, communication and interpersonal skills can likely be enhanced. Given that the IPPI scenarios were not standardized in terms of difficulty for either communication or technical skill, it is not possible

Table 1 Overall ANOVA results in communication scores with 4 IPPI scenarios

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<thead>
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<th>MSE</th>
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<td>.193</td>
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S = scenario, pre- and post-intervention scenarios; L = level, medical student or surgical resident; F = feedback, experimental or control group.

Table 2 Pre-intervention ANOVA results

<table>
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<td>2.95</td>
<td>.012</td>
<td>.097</td>
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</table>

S = scenario, 2 pre-intervention scenarios; L = level, medical student or surgical resident; F = feedback, experimental or control group.
to discuss improvements in performance from the pre-intervention to the post-intervention IPPI scenarios. What we can say is that after the feedback intervention, the experimental group performed significantly better than the control group. We did not assess whether these differences lasted beyond the immediate period of the study, and this question of retention should be addressed with further research. We would anticipate that communication skills need to be rehearsed like any other learned skill, and should be practiced using the principles of “deliberate practice,” with reflection and feedback as an essential component. How frequent these sessions should be is unclear though weekly training as part of the normal surgical skills curricula would be a reasonable model to start with. Unlike technical skills that may be taught in the laboratory and not practiced for a long period of time, communication and interpersonal skills are demanded of the resident daily in their interactions with real patients. It is therefore possible that this may provide the distributed practice necessary for ongoing improvements, though incorporation of teaching communication and interpersonal skills into a more formal curriculum will enable the requirements of “deliberate practice” to be satisfied.

Dual-tasking is a term used in the attention literature to describe the need to split cognitive resources between 2 different tasks. Each of us has a limited capacity with which we can attend to stimuli or tasks in our environment. We are free to split our attention between numerous events or stimuli if we remain within our capacity threshold.

Once we reach that threshold, we are no longer able to attend to additional stimuli, unless attention is taken away from other activities. Performance in these other activities then necessarily falters. The amount of attention needed to perform a particular task or attend to certain stimuli varies. One of the variables is how “expert” you are at that particular task. A surgeon, for example, would use much less attention to suture a wound than a medical student. Medical students and junior residents are at the start of their learning curves for many minor clinical procedures and are therefore using a larger proportion of their attention capacity to perform that activity than experienced clinicians. The additional demands of communicating while performing a procedure require dual-tasking and may affect performance in either activity. If the technical component is given higher priority, attention may be taken away from communicating. If communication is given priority, technical performance may falter. This study found that better performance on the communication scales occurred in the experimental group compared with the control group after the intervention with no significant differences between groups in technical performance for either medical students or residents. In other words, enhanced performance in communication did not coexist with a deterioration in the technical performance as might be expected by the dual-tasking literature. In fact, both groups scored lower in the post-intervention scenarios compared with the pre-intervention scenarios. A possible explanation for this may be that the IPPI scenarios postintervention were more challenging than pre-intervention, although further testing is needed to explore this hypothesis. It could also be explained if all participants found the communication and interpersonal challenges of the post-intervention scenarios more challenging (dual-tasking effect). Importantly, the lower technical scores occurred in both groups and so the effect of dual-tasking was not found to be more prominent in the experimental (feedback) group compared with the control group. Had this been the case, the higher communication scores could be explained by attention that was diverted from the technical component. What was demonstrated in this study was significantly higher communication scores in the experimental group compared with the control group with no differences between the groups in technical performance.
This study provides preliminary evidence that IPPI can be used to provide effective formative feedback. Further studies are needed to see how best to incorporate this into surgical curricula and whether these skills transfer to the real clinical setting. Formal surgical curricula that teach technical skills, while ignoring communication are at risk of not fulfilling the requirements for a fully trained surgeon. Communication skills are taught in a formal way in many medical schools but this teaching appears to be discontinued during residency. However, with increased exposure to patients and communication challenges, residency may be the best time to focus on teaching these skills and providing avenues for structured feedback. Communication and interpersonal skills training should be formally incorporated into surgical curricula—both in terms of teaching and evaluation. The integration of SPs and bench-top models opens up a realm of possibilities for both formative and summative assessment and should be the focus of further research.

Acknowledgment

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References