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The learning effects of different presentations of worked examples on medical students' breaking-bad-news skills: A randomized and blinded field trial

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ABSTRACT

Objectives: Effective instructional approaches are needed to enable undergraduates to optimally prepare for the limited training time they receive with simulated patients (SPs). This study examines the learning effects of different presentation formats of a worked example on student SP communication.
Methods: Sixty-seven fourth-year medical students attending a mandatory communication course participated in this randomized field trial. Prior to the course, they worked through an e-learning module that introduced the SPIKES protocol for delivering bad news to patients. In this module, a single worked example was presented to one group of students in a text version, to a second group in a video version, and to a third group in a video version enriched with text hints denoting the SPIKES steps.
Results: The video-with-hints group broke bad news to SPs significantly more appropriately than either of the other groups. Although no further condition-related effects were revealed, students who learned from the text version most frequently (although non-significantly) ignored unpleasant emotions (standardised emotional cues and concerns) expressed by the SPs.
Conclusions: The learning effect was strongest when the video-based worked example was accompanied by hints.
Practice implications: Video-related learning approaches that embed attention-guiding hints can effectively prepare undergraduates for SP encounters.

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1. Introduction

Successful provider-patient communication is associated with positive patient outcomes [1,2]. It is therefore essential to support the acquisition of communication skills in healthcare education worldwide [3,4].

To harness the potential of strongly-advised [5] simulated patient (SP) encounters, Swiss students, too, are encouraged to practice and internalise accepted communication principles, such as eliciting the patient's perspective and expressing empathy [6]. However, training with SPs is resource-consuming and expensive [7]; opportunities to train are limited [8,9]. Students must therefore

take full advantage of their SP training sessions [10,11]. Appropriate instructional methods are needed to optimally prepare undergraduates for their SP encounters, enabling them to maximise the benefits of this essential training [12].

One novel approach used to prepare students for SP communication training incorporates worked examples. These typically consist of an introduction to a formulated problem that includes a task (e.g. a severe diagnosis to be delivered to a patient) and a highly structured demonstration of the steps needed to accomplish this task [13]. Based on this performance-oriented scaffolding of learning content, students may adopt cognitive scripts, involving actions 'used to select effective and appropriate communication behaviour' [11].

Recent research [12] provides evidence that prior worked-example-based learning can significantly improve students' ability to deliver bad news during SP encounters. However, the authors also concluded that empirical research on worked examples is still at an early stage within the learning domain of provider-patient communication; one major identified knowledge gap is the question of which presentation mode produces the best results.

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This is a significant issue, as different presentations offer various benefits and pitfalls.

Research from other complex learning domains [14] shows that learners gain more benefit when worked examples are presented as text rather than as video. One interpretation of this finding is that students often cannot process video-based information at the speed it is presented, increasing the likelihood that they will miss critical information [15]. This problem can be avoided by using text-based worked examples; as they are static, students can process the content at their own pace [14].

However, research on the acquisition of provider-patient communication skills shows that video formats provide a broad range of 'nonverbal as well as verbal behaviours that could otherwise be lost to learning' [16] and that health profession students value video-based learning materials [17]. It therefore makes sense to investigate methods that minimise information loss, while also retaining the benefits of video-based information.

A promising, low-threshold approach is to use cues, also referred to as 'hints' [18].¹ These draw learners' attention to essential elements in the video [18], without adding new information to the instructional materials [19]. Hints can be introduced visually, using non-verbal stimuli, such as arrows [20], as well as written text [21]. However, learners must split their attention between the video-based content and the hints [18], which can strain working memory capacity and impair understanding and performance [22].

To summarise, it remains unclear which worked-example presentation format optimally prepares medical students to strengthen their communication skills in SP encounters. In addition, it is not known whether adding hints to video-based worked examples can enhance learning. We have therefore decided to conduct a randomized educational trial applying various presentations of worked examples to medical students to evaluate the effectiveness of the different methods.

In particular, we aim to clarify which learning intervention with a given worked example, presented in three formats: text, video, and video with hints, optimally prepares undergraduate medical students for an SP task involving breaking bad news.² Our first and main hypothesis is as follows:

Hypothesis 1. *Undergraduate medical students will achieve varying overall performance scores on a breaking-bad-news task with SPs, based on prior worked-example-based learning presented either as text, video, or video with hints.*

When students break bad news, one particular subtask is acknowledged to be highly challenging: responding to unpleasant emotions expressed by (simulated) patients [24]. Unpleasant emotions, including anger, fear, sadness, disgust, shock, and shame [25], must be responded to appropriately—with empathy—[26] in order to enhance patient outcomes [27]. The provider must develop the ability to recognise patients' emotions and respond appropriately [28]. This skill is difficult to acquire [29] because unpleasant emotions are often expressed, not as clearly verbalised concerns, but as ambiguous verbal or non-verbal cues [30]. A literature review [31] has identified various promising techniques for picking up emotional cues and concerns, including clarifying ambiguous feelings using open cue-based questions, reassuring patients in response to emotional expressions, demonstrating understanding, acknowledging patient feelings,

and encouraging patients to (further) express their emotions. Applying the Verona coding system [30], these techniques can be categorised as *space-providing* responses [32]. Given research [12] on worked examples and breaking-bad-news skills learning, it can be postulated that undergraduate medical students should also gain scripts on how to provide space for emotional cues and concerns, based on learning from worked examples. We have therefore formulated a second hypothesis to address this particular area:

Hypothesis 2. *To varying degrees, undergraduate medical students will provide space-providing responses to the emotional cues and concerns of SPs, based on prior worked-example-based learning presented in one of three formats: text, video, or video with hints.*

Research [33] also shows that, in certain situations, space-providing responses are perceived as inappropriate. In such cases, bypassing unpleasant emotions by giving *space-reducing* responses to emotional cues and concerns [32] may be perceived as adequate. To control for either possible perception, we will test a third and final hypothesis:

Hypothesis 3. *The perceived appropriateness of space-providing versus space-reducing responses to the emotional cues and concerns expressed by SPs will differ, independent of presentation format.*

2. Methods

This field study has applied a randomized, blinded between-subjects design to test our hypotheses. Participants were assigned to one of three learning conditions and presented with a worked example formatted as text, video, or video with hints. Participants and assessors were not told about the hypotheses or alternative interventions until the data were collected and the performance ratings were complete.

2.1. Procedure

Participants were sampled from 228 fourth-year medical students at Bern University, Switzerland, enrolled in a mandatory clinical communication course with SPs [see 34]. This course offered four communication scenarios in rotation (breaking bad news, motivational interviewing, informed consent, and talking about sexuality). Students worked in pairs, with one taking the role of active physician and the other observing. The observer watched the encounter on a monitor (using headphones) from a skills lab outside the consulting room, and later provided feedback to the active peer.

All 114 students who actively conducted the breaking-bad-news scenario were invited to participate. They progressed through the steps shown in Fig. 1, which also mentions the reasons for and total number of dropouts.

2.2. Learning module

After being randomly assigned to one condition, students received online access to a learning environment, which provided the materials they needed to prepare individually for the breaking-bad-news scenario one week later. The preparatory learning environment was a web-based learning module in German, inspired by a US medical school's tool [35]. It introduced the SPIKES protocol for delivering bad news to patients [33]. The SPIKES acronym covers the steps in Table 1. The learning module provided the same instructions and learning content to all participants (see Fig. 2); the only difference was the experimentally varied presentation format of the embedded worked example.

¹ To avoid confusion with *emotional cues*, also addressed in this paper, we refer hereafter to 'hints' when discussing cueing as an attention guidance technique.

² We used breaking bad news as the communication task because it is known to be a critical and frequent, but also challenging and stress-provoking, task for medical students [23].

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