

Strengths and Weaknesses of Simulated and Real Patients in the Teaching of Skills to Medical Students: A Review

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The aim of this review was to identify the strengths and weaknesses of the roles of real and simulated patients in undergraduate medical education. The literature was reviewed in relation to four patient roles: real patients as educational "resource" (passive role), real patients as teachers (active role), and simulated patients as educational resource and teachers. Each of the four patient roles was found to have specific advantages and disadvantages from the perspectives of teachers, students, and patients. For example, advantages of real patients as educational resource were patient-centered learning and high patient satisfaction. Disadvantages were their limited availability and the variability in learning experiences among students. Despite the considerable amount of literature we found, many gaps in knowledge about patient roles in medical education remain and should be addressed by future studies. (*Sim Healthcare* 3:161-169, 2008)

Key Words: Active or passive patient roles, Patient-instructors, Real patients, Review, Simulated or standardized patients, Undergraduate medical education.

Patient contacts have always been an integral part of undergraduate medical education. Early patient contacts have been recommended by the Association of American Medical Colleges and the UK General Medical Council.¹ A recent review identified several positive effects of early patient contacts: they increased student motivation, taught students "things that cannot be learned from books," increased students' confidence to interview patients and eased the transition from preclinical to clinical training.^{2,3} Furthermore, patient contacts enhanced students' feelings of empathy and responsibility toward patients and fostered their professional identity.²⁻⁴ Patient contacts also help students build integrated skills for clinical reasoning, communication, history taking, and physical examination.^{1-3,5} In his review, Aspegren⁶ found that experiential methods such as patient contacts with immediate feedback from teachers were more instructive in the teaching of communication skills to medical students than traditional methods such as lectures.

Patient contacts also help students develop "illness scripts." Illness scripts are cognitive structures containing features of prototypical or real patients together with clinically relevant information about diseases.⁷ Patient contacts

may supply content for illness scripts and thus help students develop their ability to handle clinical problems.

Patient contacts in medical education may involve real patients or simulated patients (SP). The role of patients in education may be passive, that is, limited to presentation of complaints and symptoms, or it may be active as when the patient actually takes on the role of the teacher. In situations, such as assessments, where repeated identical role performance is required, SPs are also referred to as standardized patients.

Although the importance of patient contacts is generally recognized, we know little about the various roles of both real patients and SPs in undergraduate medical education and their value from the perspectives of students, teachers, and patients.¹

We reviewed the literature to identify the different roles of real patients and SPs in undergraduate medical education and the benefits and limitations of these roles. We were particularly interested in how the roles relate to each other. In this review we did not consider the role of patients in assessment, because we were specifically interested in the contribution of patients to *teaching*.

METHODS

We searched the Pubmed and Eric databases using the search terms: (real or active) patients, patient partners or instructors, patient simulation, standardized or simulated patients, and undergraduate medical education or teaching. The databases were searched from their onset throughout March 2006. Additionally, we searched the references of articles to identify relevant articles that we might have missed. Articles were selected for inclusion in the review by one of the authors (L.B.). Articles were selected based on the abstract or the full paper if the abstract was absent or did not provide sufficient information. We included all retrieved research articles and descriptive articles published in English on the

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subject of real patients or SPs involved in undergraduate medical education. Even though real patients and SPs are also used in graduate and postgraduate medical education, we concentrated on undergraduate medical education to define the sphere of the review. Although assessment is an important part of education, we did not include articles dealing with assessment.

We categorized the selected articles based on four types of patient roles derived from the literature: real patients as an educational resource (passive role); real patients as teachers (active role); SPs as an educational resource; and SPs as teachers. The patient role was categorized as active when real patients or SPs were actively involved in teaching. This meant that the patient had the teacher's role, preferably in the absence of other teachers.

The aim of this review was to identify strengths and limitations of the four types of patient roles from the perspectives of students, teachers, and patients.

REAL PATIENTS AS AN EDUCATIONAL RESOURCE

Patients as educational resource are used in many different educational settings, for example in bedside teaching. Generally, this is considered a valuable method for teaching skills, such as physical examination, history taking, communication, and procedural skills.^{8–10} The opportunity for students to observe skill performance by experienced clinicians and the fact that the patient is at the center of teaching are perceived as beneficial.¹⁰

We found two comparative studies on the effectiveness of bedside teaching in the teaching of skills, in terms of student scores on an objective structured clinical examination (OSCE).^{11,12} These studies are summarized in Table 1. Bedside teaching was found to be effective in comparison with instruction and practice sessions or structured clinical teaching.

Two studies reported on students valuing bedside teaching and considering it an effective educational method.^{13,14} A large majority of students considered bedside teaching an effective way to develop physical examination, history taking, and communication skills.¹⁴ Particularly feedback at the bedside was perceived as high-quality teaching by students.¹³

Most studies show that patients feel very positive about their participation in bedside teaching^{14–19} Nair et al.¹⁴ found that 77% of patients enjoyed bedside teaching, with 84% saying they would recommend it to others.

One of the limitations of patients as an educational resource is concern among students and faculty about patients' comfort¹⁸ and concern about bedside teaching being stressful to patients.²⁰ However, no physiological signs of stress (changes in heart rate, blood pressure, or plasma norepinephrine levels) were found in patients during bedside teaching.¹⁶ Furthermore, patients reported bedside teaching not being stressful.^{15–17} Many even found bedside teaching a reassuring experience which helped them understand their illness. Patient satisfaction with bedside teaching may be further improved, for instance by paying more attention to consent and confidentiality.^{17,19}

Another limitation of bedside teaching is variability because of differences between individual clinical teachers and

TABLE 1. Comparative Studies on the Effectiveness of Real Patients as an Educational Resource (Bedside Teaching)

Reference	Participants	Control	Intervention	Outcome	Conclusion
Cooper et al. ¹¹	64 fourth-year medical students, 32 in control group, 32 in intervention group.	1 wk, morning: demonstration of videotaped GI physical examination and practice on healthy subjects, supervised by teacher. Afternoon: teaching in history taking.	1 wk, morning: like the control group. Afternoon: bedside teaching sessions on GI physical examination techniques (hospitalized patients).	Assessment on GI physical examination skills (OSCE), evaluators blinded. Intervention group performed better.	Bedside teaching in addition to instruction and practice sessions is more effective than instruction and practice sessions alone in the teaching of GI physical examination.
Hill et al. ¹²	66 third-year medical students.	11 2-h bedside teaching sessions on physical examination and history taking skills, cross-over to intervention group after assessment.	11 2-h structured clinical teaching sessions (lecture and small group teaching) on physical examination and history taking skills, cross-over to control group after assessment.	2 assessments on physical examination and history taking skills (MCQ and OSCE), 1 at the end of the first series of sessions and 1 after cross-over. No difference was found.	Traditional bedside teaching is as effective as structured clinical teaching in the teaching of physical examination and history taking skills.

GI; gastro-intestinal; MCQ, multiple choice questions; OSCE, objective structured clinical examination.

the uncertain availability of suitable patients.^{14,21–24} Patients may be too ill or their condition too complicated to participate in bedside teaching. In addition, bedside teaching is affected by reductions in inpatient beds, shorter hospital stays, and reductions in the number of faculty teachers,^{21,24,25} whereas increasing numbers of students, such as medical students, nursing students, and physician assistants in training, require patient contacts.²² These limitations might have contributed to the decline in bedside teaching from 75% of clinical teaching in the 1960s to an estimated less than 16% today.²⁶ In a study using direct observation, the median time spent at the bedside during teaching rounds was much less compared with the time spent in the classroom (2.5 minutes and 69 minutes, respectively).²⁷ Waterbury²⁴ suggested that SPs might compensate for the limitations of bedside teaching.

In summary, the use of patients as an educational resource in bedside teaching is considered valuable and effective in the teaching of skills to undergraduate medical students, in comparison with other teaching methods such as structured clinical teaching and from the perceptions of students. Although students and teachers worry about patients' comfort, patients were reported to enjoy bedside teaching. There are limitations of bedside teaching, such as the unpredictable availability of suitable patients and the high variability in learning experiences.

REAL PATIENTS AS TEACHERS: PATIENT-INSTRUCTORS

Real patients are increasingly fulfilling active teaching roles in undergraduate medical education.²⁸ In most studies, patient-instructors are used to actively teach skills such as physical examination and communication skills.^{22,29–36} They have also been used in the teaching of factors and circumstances affecting health and health care.³⁷

We found two comparative studies on the effectiveness of patient-instructors in the teaching of skills, in terms of student scores on an OSCE.^{22,34} In these studies, summarized in Table 2, patient-instructors were compared with physicians in the teaching of physical examination skills to students. Patient-instructors were found to be at least as effective as physicians. Studies comparing the teaching by patient-instructors to other teaching methods have not been found.

Studies on patients' views show that patients value their active teaching role.^{28,35,37,38} They regard themselves as important contributors to medical education as experts and exemplars of their particular medical condition and as facilitators of the development of students' professional skills and attitudes.³⁸ Plymale et al.³⁵ found that cancer survivors enjoyed participating in a clinical teaching course, were willing to participate in future courses and perceived their role as an important and effective part of the course. Patients appreciate the opportunity to talk and learn about their condition.^{28,38} Furthermore, contributing to the training of future doctors gives them a sense of empowerment.^{28,35}

Evaluations of students with regard to teaching by patient-instructors are positive.^{22,28,31–35} Instruction on joint examination by patients with arthritis was rated as beneficial by 93% of the students.³³ Students valued the direct feedback on their skill performance provided by patient-instructors as it helped them in identifying their strengths and weaknesses.^{28,31} Furthermore, teaching by patient-instructors increased students' confidence in physical examination skills and reduced anxiety.^{22,28} Stillman et al.³¹ suggested patient-instructors enhance the integration of technical and interpersonal skills. They also suggested patient-instructors are better able than teachers to highlight the patient's perspective and give feedback on subjective aspects of physical examination.³¹ Therefore, their expertise may complement that of teachers.³⁷

There are limitations too, however. Being patient-instructor demands a great deal from patients. Some patients found it tiring, especially when they were ill.³² Stillman et al.³¹ developed criteria for patient-instructors: their physical findings must be evident, their physical condition must allow repeated examination, and they should be able and willing to learn about their disease. Another limitation is that of costs in terms of faculty time spent on training and maintaining the skills of patient-instructors.³² However, this investment may be worthwhile because trained patient-instructors are 50% to 75% less expensive than faculty teachers.³¹ In one study, the use of real patients (as opposed to SPs) reduced training time because real patients required no training in simulating physical findings.³⁶

TABLE 2. Comparative Studies on the Effectiveness of Real Patients as Teachers

Reference	Participants	Control	Intervention	Outcome	Conclusion
Anderson and Meyer ²²	46 second-year students in intervention group, 41 randomly selected students in control group.	Physical examination (neurological, cardiovascular, respiratory, skeletomuscular) instruction by physician.	Physical examination (neurological, cardiovascular, respiratory, skeletomuscular) instruction by patient-instructor, 2.5 h, 2 patient-instructors: 4 students.	Assessment of physical examination skills (OSCE), 3–9 wks after instruction. Higher scores of students in intervention group on neurological, cardiovascular and respiratory examination, no difference on skeletomuscular examination.	Teaching of physical examination skills by patient-instructor is comparable or even better than teaching by physicians.
Hendry et al. ³⁴	Fourth-year medical students, performance assessment in 12 students in control group, 11 in intervention group.	75–90 min instruction in small group (7–8 students) on musculoskeletal examination skills for arthritis by rheumatologist.	75–90 min instruction in small group (7–8 students) on musculoskeletal examination skills for arthritis by patient-instructor.	Assessment of wrist and hand examination in part of students (OSCE), 13 d after instruction, evaluators blinded. No difference was found.	Patient-instructor equal to rheumatologists in the teaching of musculoskeletal examination skills for arthritis

OSCE, objective structured clinical examination.

In summary, although there are few comparative studies on the effectiveness of patient-instructors, patients-instructors are suggested to be equally effective as physicians in the teaching of specific physical examination skills to undergraduate medical students. Students value being taught by patient-instructors. Skills can be practiced and physical abnormalities can be found in a low anxiety setting. In addition to the teaching of skills, patient-instructors are trained to give constructive feedback to the student. This is a considerable advantage of patient-instructors as opposed to patients. An active role in the teaching of students is also enjoyed by patients. A limitation of this teaching method for teachers is the extensive training time needed. In addition, only a select group of patients, for example those with stable physical findings who are not too ill, can be trained to teach.

SPS AS EDUCATIONAL RESOURCE

SPs are individuals trained to perform the role of a patient realistically and consistently. SPs were introduced by Barrows in 1964 and they have been extensively used in medical education ever since.^{39–41} Studies have suggested SPs being a valuable complement to real patients.^{21,23,42} We found only one study directly comparing the effectiveness of SPs as educational resource to real patients in the same role.²¹ This study, summarized in Table 3, found skills teaching with SPs is as effective as skills teaching with inpatients, in terms of student scores on an OSCE. Student evaluations showed a nonsignificant trend toward greater satisfaction with the SP encounters, especially with the feedback provided to the students.²¹ Other advantages of SPs over real patients, portrayed by Barrows, are that they are available, safe, adaptable to students' learning needs and minimize variability in learning experiences between students.⁴¹ SP encounters can be arranged at any time and in any setting, unlike encounters with real patients whose presence in hospital or general practice is difficult to control. SPs offer safety, because students need not feel embarrassed if their interviewing and physical examination skills are imperfect. Mistakes are acceptable, even in difficult and sensitive situations, such as the pelvic examination or breaking bad news. SP performance can be adapted to specific educational purposes. For example, an SP encounter can be interrupted to discuss the case or give tips to the student and SPs can be examined repeatedly to perfect students' examination techniques. Also, the difficulty of the patient encounter can be adapted to match a student's competence level. Variability in learning can be minimized by

allowing each student to question and examine an SP who is simulating the same medical problem in the same way. SPs can simulate a wide range of physical findings, for example wheezing, abdominal tenderness, muscle weakness, and tremor.⁴¹ Furthermore, SPs are easy to train and can contribute to training a variety of skills.^{23,40,41} People of various age groups may be SPs. For example, adolescent girls have been reported to highly value their performance in a patient role.⁴³ SPs reported being strongly motivated and greatly enjoying their encounters with students.⁴⁴

Students enjoyed workshops with SPs in which they learned about basic interviewing skills and interview challenges, such as breaking bad news.⁴² They considered the workshops effective and valued the realistic learning with immediate feedback from the SP, without having to worry about harming real patients.

One study suggested that students prefer real patients to SPs because of their authenticity.⁴⁵ This might be a limitation of SPs. However, a recent systematic review on incognito SPs visiting practicing physicians (who do not know when they are visited by SPs) showed SPs were detected in less than 15% of the cases.⁴⁶ Detection rates of even less than 1% were found. These findings suggest SPs can be very authentic.

As with the real patients, SPs may also experience negative effects of their role. In a recent study 73% of SPs reported negative effects of patient role performance, for example fatigue and dissatisfaction with their performance.⁴⁷ However, a subsequent study showed that the frequency and intensity of these negative effects were minor.⁴⁸

In summary, in addition to real patients SPs are considered valuable educational instruments. SPs generally enjoy their work despite some minor negative effects of performing a patient role. SPs have considerable advantages compared with real patients used as an educational resource, including their availability and flexibility. Also, SPs can be trained to provide students with feedback, which is valued by the students.

SPS AS TEACHERS: SP-TEACHERS

With additional training SPs can undertake active teaching roles. To avoid confusion with real patients in the patient-instructor role, we will use the term SP-teacher to refer to SPs who teach.

Several comparative studies have assessed the effectiveness of SP-teachers in the teaching of skills, in terms of student scores on an OSCE. These studies are summarized in Table 4.

TABLE 3. Comparative Study on the Effectiveness of SPs as an Educational Resource

Reference	Participants	Control	Intervention	Outcome	Conclusion
McGraw et al. ²¹	75 first-year medical students, 20 randomly selected students in intervention group, 55 in control group.	5 inpatient contacts (+1 SP contact and 1 videotaped encounter), 2 students per patient, 90 min, history and physical examination, feedback from tutor and peers.	7 SP contacts, 2 students per SP, 60 minutes, history and physical examination, feedback from tutor, peers and SP.	Assessment of clinical skills (OSCE). No difference was found.	SP contacts are equally effective as inpatient contacts in acquiring clinical skills.

OSCE, objective structured clinical examination.

TABLE 4. Comparative Studies on the Effectiveness of SPs as Teachers

Reference	Participants	Control	Intervention	Outcome	Conclusion
Study comparing SP teachers to no instruction					
Colletti et al. ⁶⁵	21 randomly assigned junior medical students in intervention group, 17 in control group.	No instruction on breaking bad news.	Practice session on breaking bad news with SP-teacher.	Assessment of breaking bad news skills (OSCE), evaluators blinded. Better performance of students in intervention group.	SP-teachers are effective in teaching students to break bad news.
Studies comparing SP teachers to physicians					
Vannatta et al. ⁶⁶	154 first-year students, 43 students randomly assigned to intervention group, 41 and 36 students to control groups.	Group 1: 8 h, instruction by faculty, practicing interviewing skills with SPs, feedback from faculty and peers. Group 2: 8 h, role play with feedback from faculty and peers.	8 h, instruction by faculty, practicing interviewing skills with SPs, feedback from SPs and peers.	Assessment of interviewing skills (OSCE) before and after instruction, evaluators blinded. Higher scores on open-ended questions and empathy in intervention group, no difference on other items.	SPs are at least as effective as faculty in teaching interviewing skills to medical students.
Davidson et al. ⁶²	83 first-year students in intervention group, 118 second-year students in control group.	Instruction on physical examination by faculty and practice on each other and inpatients supervised by faculty.	Introduction on physical examination by faculty and practice on each other supervised by SPs.	Assessment of physical examination skills (OSCE), 6 stations, evaluators not blinded. Higher scores in intervention group on 4 stations, no difference on 2 stations.	SPs can effectively teach physical examination to medical students.
Holzman et al. ⁶⁷	38 second-year students, 14 and 14 students randomly assigned to experimental groups, 10 to control group.	Instruction on pelvic examination by gynecologist, practice on patient supervised by gynecologist.	Group 1: instruction by physician and practice on SP, supervised by SP. Group 2: instruction by and practice on SP.	Assessment of pelvic examination skills (OSCE), interpersonal and technical skills, evaluators blinded. Higher scores of students trained by SPs, in both intervention groups.	SPs are effective in the teaching of pelvic examination skills to medical students.
Kleinman et al. ⁵¹	33 second-year students of one medical school in control group, 48 third-year students of another medical school in intervention group.	Instruction on pelvic examination by physician, practice on SP supervised by physician, in preclinical course.	Instruction by SP and practice on SP in preclinical course.	Assessment of pelvic examination skills (OSCE) interpersonal and technical skills) after gynecology clerkship. Higher scores on interpersonal skills in intervention group, no difference on technical skills.	Effects of SPs teaching interpersonal skills related to pelvic examination persist after exposure of students to clinical clerkship.
Livingstone and coauthors ^{50,52}	100 second-year students, 50 randomly selected students in intervention group, 50 in control group.	Instruction on gynecologic history and pelvic examination (lecture and video), practical instruction by physician (on real patient).	Instruction on gynecologic history and pelvic examination (lecture and video), practical instruction by SPs.	Assessment of pelvic examination skills (OSCE), communication and technical skills) immediately after and 1 year after instruction, evaluators blinded. Better performance of students taught by SPs.	SPs are more effective in teaching pelvic examination compared to physicians using real patients, even at 1 year after teaching.
Studies comparing SP teachers to traditional teaching methods					
Levenkron et al. ⁶⁸	Second-year students, class 1985 control group, class 1986 intervention group.	Instruction on risk-factor counseling skills by lectures and small group sessions with patient in group.	Instruction on risk-factor counseling skills by SP-teacher (individual student).	Assessment of risk-factor counseling skills (OSCE), 6 mos after instruction, evaluators blinded. Better performance of students in intervention group.	SPs are more effective in teaching risk-factor counseling skills compared to lectures combined with small group sessions.
Fletcher et al. ⁴⁹	Second-year students, performance assessment in 38 students of control group (class 2001), 166 students in intervention group (class 2002).	Lecture on examination of patients with abdominal pain.	Lecture on examination of patients with abdominal pain and practice session with SP-teacher.	Assessments of history taking and physical examination skills (OSCE) 18 mos after instruction. Better performance in intervention group.	Adding a practice session with SP-teachers to a lecture is more effective than a lecture alone in teaching history and physical examination at 18 mos after intervention.
Sachdeva et al. ⁵⁴	153 third-year medical students randomly assigned to control group and intervention group.	Traditional clerkship teaching.	Traditional clerkship teaching and instruction and practice session by SP on breast and abdominal examination, small group and one-to-one.	Assessment of breast and abdominal examination skills and professionalism during examination (OSCE). Better performance of students in intervention group.	A single instruction session by SP-teachers is effective in the teaching of breast and abdominal examination skills.
Papadakis et al. ⁵³	First-year students, 35 randomly assigned to intervention group, 37 to control group.	Lecture on smoking-cessation techniques and practice with role-playing	Lecture on smoking-cessation techniques and practice with SP-teachers	Assessment of smoking-cessation skills (OSCE), 2 wks after practice. No difference was found.	SP teachers are as effective as role-playing in the teaching of smoking-cessation techniques
Study comparing SP teachers to instruction on models					
Nelson ⁶⁹	Second-year medical students, 15 assessed in intervention group, 15 assessed in control group.	Instruction and practice of pelvic examination skills on plastic model.	Instruction by SP, practice on SP.	Assessment of pelvic examination skills (OSCE), evaluators blinded. Students trained by SPs performed better on palpation of ovaries.	SP teachers are more effective in teaching palpation of ovaries compared to instruction on plastic models.

OSCE, objective structured clinical examination.

Most studies show SP-teachers are effective in the teaching of skills to medical students. Students who were taught skills, such as communication and pelvic examination skills, by SP-teachers had similar or even better OSCE scores compared with those taught by physicians or faculty teachers. Furthermore, students taught by SP-teachers performed at least equally as those taught by traditional teaching methods, such as lectures, role-playing or instruction on (plastic) models, in the teaching of skills. Three studies showed retention of skills over a longer period of time in students taught by SP-teachers.^{49–51} Some comparative studies also reported views of students on the instruction they had.^{52–54} All of these studies showed students preferred instruction by SP-teachers to teaching by physicians or to traditional teaching methods such as role-playing.

Several studies primarily focused on student evaluations with regard to instruction by SP-teachers. Most studies found students highly value the teaching of skills, particularly pelvic examination skills, by SPs.^{55–60} Students felt calmer, more secure and more confident about performing a pelvic examination after instruction by SP-teachers.^{55,58,60} Students also valued the ability of SP-teachers to provide feedback.^{55,59} Levenkron et al.⁶¹ reported students considered direct feedback from SP-teachers on behavioral counseling skills more effective than feedback from a faculty member on a video-

taped SP encounter. Two studies suggested SP-teachers are better able to give feedback on certain parts of the students' pelvic examination, for example on the gentleness of the examination and on palpation of the ovaries, as opposed to traditional teachers.^{56,57}

A limitation of the use of SP-teachers is the time and effort required to train SPs in their role of both patient and teacher. Davidson et al.,⁶² however, reported considerable cost savings because of teaching by SP-teachers. Although most studies reported students preferring instruction by SP-teachers to teaching by physicians or role-playing, two did not.^{63,64} In these studies, student evaluations regarding a didactic lecture on appendicitis or peripheral vascular disease were compared with student evaluations regarding an instructional SP interaction on the same subject. Overall, students preferred the didactic lecture, although they evaluated the SP interaction more favorably when it was preceded by the lecture.^{63,64}

Only few studies, summarized in Table 5, have compared real patients to SPs in the teaching of skills to medical students. Most studies found real patient encounters are comparable to SP encounters. One study, however, found that communication skills training by real patients led to a stronger focus on the psychosocial content of the medical interview, whereas training by SPs resulted in significantly better verbal skills, such as summarization.⁴⁵ Based on these find-

TABLE 5. Studies Comparing Real Patients to SPs in the Teaching of Skills to Students

Reference	Participants	Control	Intervention	Outcome	Conclusion
Helfer et al. ⁷⁰	22 third-year medical students.	See intervention.	2 encounters per student, 11 students real mother followed by simulated mother, 11 students vice versa, randomly assigned. Half of mothers presented to students as opposite of what they were (real or simulated).	Scores of students on history content and interaction checklists. No difference was found between groups.	Students' pediatric interviewing skills in SPs encounters are equal to skills in real patient encounters.
Sanson-Fisher et al. ⁷¹	40 second-year students, randomly selected, 10 students per group. Students unaware of having a real patient or SP encounter.	Group 1: 2 real patient encounters Group 2: real patient encounter followed by SP encounter.	Group 3: 2 SP encounters Group 4: SP encounter followed by real patient encounter.	Scores of students on empathy scale, evaluators blinded. No difference was found between groups.	Empathy portrayed by students in real patient encounters is similar to empathy portrayed in SP encounters.
Simek-Downing et al. ⁴⁵	64 third and fourth-year medical students, 41 in intervention group, 23 in control group.	Interview with real patient, instruction and feedback on communication skills by patient and teacher.	Interview with SP, instruction and feedback on communication skills by SP and teacher.	Assessment of communication skills (OSCE, verbal skills and content) 6 wks after instruction. Control group showed better psychosocial content, intervention group showed better summarization.	SPs are most valuable in teaching verbal interviewing skills and real patients are most valuable in teaching focal content of the interview.
Gilliland et al. ⁷²	323 second-year students, 183 self-selected students in control group, 140 in intervention group.	Instruction on history taking and physical examination with real patients.	Instruction on history taking and physical examination with SPs.	Assessment of history taking and physical examination skills, multiple instruments (e.g. OSCE, teachers' evaluations, MCQ). No difference was found	SPs are as effective as real patients in the teaching of history taking and physical examination.

OSCE, objective structured clinical examination; MCQ, multiple choice questions.

ings, it was suggested to use SPs in the early stages of communication skills training and real patients in later stages when students have mastered the basic interviewing skills.

In summary, SP-teachers are effective in teaching communication skills and physical examination skills such as pelvic examination skills. SP-teachers are at least as effective as traditional teaching methods such as didactic lectures, use of plastic models and teaching by physicians or faculty teachers. In general, students value the teaching by SP-teachers and regard it more effective than traditional teaching methods. However, in two studies students valued didactic lectures more than the teaching by SPs. The literature suggests real patients and SPs are useful for teaching different parts of communication skills.

The advantages and disadvantages of the different roles of patients in teaching skills to medical students are summarized in Table 6.

DISCUSSION

Most of the studies in our review suggest that real patients and SPs make a highly valued and indispensable contribution to undergraduate medical education in passive and active roles. Simulated and real patients, the latter especially in their teaching role, provide a safe, low anxiety learning environment where students can learn from immediate feedback and their own mistakes and build their competence and confidence.

The key aspects of educational experiences with real patients appear to be the presentation of actual abnormal physical findings and unique insights from the patient's perspective. The advantages of SPs are that they are controllable and flexible. They are available when needed, adaptable to students' needs, offer uniformity of educational experiences across students, and enable repeated practice of skills. They also have an excellent track record for teaching related to sensitive areas, such as breaking bad news and pelvic examination.

Real patients have limitations that place restrictions on their use, however, desirable it may be deemed to be. There are fewer available and suitable patients because of changes in health care and there are concerns about the patient's comfort and confidentiality.

A possible limitation of the use of SP-teachers might be their costs in terms of faculty time required for training. However, real patients also require training for their teaching roles and once trained, both SP-teachers and patient-instructors seem to be less expensive than faculty teachers. We believe patient contacts remain essential in medical education, even with the rapid development of realistic simulation techniques. Initiatives to integrate (simulated) patient contacts and simulation techniques are therefore highly welcomed by us. In addition, we think that both real patients and SPs should not be burdened excessively by their educational roles. Their health and well-being should be a strong concern for program directors and teachers.

Our review has some limitations. Only one researcher searched the databases and selected studies for inclusion in the review. Therefore the review was not systematic. Although we made every effort to make our searches as thorough as possible, selection bias cannot be ruled out. Furthermore, relatively few comparative studies were found in our review. Although the majority of these studies used high-quality experimental designs, many used rather small populations. Many studies in our review were descriptive in nature. This may have influenced our results. Finally, for some studies in our review the distinction between the four patient roles turned out to be somewhat artificial as a small amount of overlap was found between the roles in these studies, for example, real patients who simulated some aspects of their role or SPs who had actual findings on physical examination. Although most studies were clear on whether real patients or

TABLE 6. Advantages and Disadvantages of Different Patient Roles

Patient Roles	Advantages	Disadvantages
Bedside teaching	Teaching of many different skills Patient-centered learning High patient satisfaction	Limited availability of patients Concerns for patients comfort and confidentiality High variability in students' learning Difficult to maintain with fewer available patients in hospital
Patients as teachers	Effective teaching method for many different skills Direct feedback from patient Enjoyed by students and patients Offers a unique insight from the patient's perspective Less expensive than faculty teachers once trained	Takes considerable training time and faculty investment Only selective patient groups can be trained
SPs as educational resource	Direct feedback from SP Available at various times and in various settings. Teaching of many different skills in a safe environment SP interaction can be manipulated for educational purposes Minimizes variability in learning	Negative effects of SP performance for SPs Investment in training SPs
SPs as teachers	Effective teaching method for many different skills Safe learning environment Direct feedback from SP Available at various times and in various settings	Students not always perceive it as effective compared to lectures Time for training SPs

SPs were used, as educational resource or as teachers, this might have influenced our results.

Further research should compare the effectiveness of real patients in the role of teachers to other teaching methods such as instruction on hospitalized patients or models. The role of patient-instructors in the teaching of skills in addition to physical examination skills, such as history taking and communication skills, is another area for future research. In addition, further research is needed with regard to the comparison of real patients to SPs. Despite the considerable amount of literature we found, many gaps in knowledge about patient roles in medical education remain and should be addressed by future studies.

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