

## TWELVE TIPS

# Twelve tips for excellent physical examination teaching

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## Abstract

**Background:** Physical examination (PEX) skills are declining among medical trainees, yet many institutions are not teaching these systematically and effectively. Many variables contribute to effective teaching: teachers' confidence in their clinical skills, ability to demonstrate and assess these skills; availability of suitable patients; trainee attitude and fatigue; belief that institutions do not value clinical teachers. Finally, the relevance and significance of a systematic exam must be demonstrated or the teaching degenerates into a 'show-and-tell' exercise.

**Aims:** This paper describes twelve practical teaching tips that can be used to promote high quality PEX teaching in 5 minutes or 45 minutes.

**Teaching tips:** (1) Diagnostic hypotheses should guide reflective exam; (2) Teachers with the best clinical skills should be recruited; (3) A longitudinal and systematic curriculum can tailor teaching to multiple learner levels (4) Integration of simulation and bedside teaching can maximise learning; (5) Bedside detective work and games make learning fun; (6) The 6-step approach to teach procedures can be adopted to teach PEX; (7) Clinical teaching at the bedside should be increased; (8) Linking basic sciences to clinical findings will demonstrate relevance; (9) Since assessment drives learning, clinical skills should be systematically assessed; (10) Staff development can target improvement of teachers' clinical skills for effective teaching; (11) Technology should be used to study utility of clinical signs; (12) Institutions should elevate the importance of clinical skills teaching and recognize and reward teachers.

**Conclusions:** PEX is important in patient-physician interactions, a valuable contributor to accurate clinical diagnosis and can be taught effectively using practical tips. To reverse the trend of deficient clinical skills, precision of clinical findings should be studied and exam manoeuvres that do not contribute to diagnosis discarded; institutions should value clinical skills teaching, appoint and fund core faculty to teach and provide staff development to improve teaching skills.

## Introduction

Teaching clinical skills in general and physical examination (PEX) in particular is unique and challenging compared to other methods of clinical teaching (Cox 1998). There are many variables that make up an effective PEX teaching encounter including: teachers' own clinical skills; trainees' prior knowledge, skills and interest; availability of patients with the necessary findings; patient willingness to be examined by a group of doctors and trainees who may not have any impact on their clinical care; the physical environment which is usually less than comfortable; trainee fatigue level etc. Even if all the factors mentioned above are perfectly aligned, the teachers themselves must be additionally skilled at demonstrating clinical signs and diagnosing when trainees have achieved those skills. Finally, the relevance of performing a systematic PEX and the significance of findings must be evident to trainees or the session quickly degenerates into a 'show-and-tell' exercise.

It has been noted that clinical skills teaching is not consistent across clinical rotations nor is it longitudinal. At our institution, for e.g., medical students learn PEX during two separate 'introduction to clinical medicine' blocks in their

second year, sporadically and inconsistently during their third year clerkships, thereafter it is assumed that trainees have learned it all and not pursued systematically during their postgraduate years. There is marked variability in teaching across clerkships and the quality of the PEX training is entirely dependent on their clinical attachments and consultants. Often, it is their residents who end up teaching students and their own clinical skills are lukewarm at best.

Investigators suggest that a carefully obtained history and a focused physical exam contribute more to diagnoses than investigations alone even in the current medical environment (Peterson et al. 1992; Bordage 1995). To resuscitate clinical skills among clinicians, institutions need to raise the teaching of it to the highest priority, appoint core faculty to teach and invest in staff development.

## Key challenges to effective teaching of physical examination

1. Teachers lack confidence in their own exam skills (Ramani et al. 2003).

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2. Teachers lack the skills to demonstrate PEx effectively and efficiently (Cox 1998).
3. Medical schools teach the long winded systematic approach to exam without teaching history based hypotheses formulation and hypotheses based focused physical exam (Benbassat et al. 2005).
4. Lack of a systematic, longitudinal curriculum with different levels of teaching for different levels of trainees (Goldstein et al. 2005).
5. Lack of clarity in setting learning objectives for the teaching session, i.e. describing clearly what to look for and how to look for it (Cox 1998).
6. Not explaining what the findings are caused by, the differential diagnoses and clinical significance of findings (Cox 1998).
7. Teachers lecturing too much or demonstrating without providing trainees ample time and opportunities to practise (Cox 1998).
8. Deficient assessment of physical exam. This includes exclusive use of standardized patient based OSCE without observation in clinical practice as well as absence of physical exam assessment of postgraduate trainees in the United States (Holmboe 2004; Hatala et al. 2007b).
9. Medical institutions not valuing clinical skills enough and relying on technology to provide all the answers (Ramani et al. 2003).

The following twelve tips are practical strategies that institutions and individual teachers can use to promote high quality physical exam teaching (Table 1).

### Tip 1

Physical exam should be reflective guided by diagnostic hypotheses

The traditional textbooks of clinical diagnosis describe very detailed and systematic physical exam of each organ system, which may be impractical in clinical settings where time is of the essence. Benbassat and colleagues (Benbassat et al. 2005) question the value of such a systematic head to toe exam and state that this method of exam divorces data collection from clinical reasoning. They suggest that challenging students to seek specific physical findings may increase the likelihood of detecting findings and may transform patient history and

physical from routine activities into intellectually exciting experiences. A reflective examination is guided by diagnostic hypotheses, detecting cues for diagnosis in patients based on their complaints and formulating differential diagnosis.

A classic example is the neurologic exam which has traditionally been a time intensive exam. Some authors suggest classifying neurologic exam skills into essential, marginal and reserve skills (Glick 2005). Essential skills are mandatory steps and contribute most to diagnosis, marginal skills are steps of the exam that do not necessarily add to diagnostic hypotheses and reserve skills are those that would be used in specific situations to guide diagnosis. Glick argues that an evidence-based, progressive approach has the potential to impact positively teaching and efficiency of practice as well as externally mandated quality standards. This classification of PEx skills can be readily applied to other organ specific exam.

### Tip 2

The most skilled clinicians should be recruited for PEx teaching

It appears that many institutions delegate junior faculty or senior trainees to teach PEx sessions. With the reported decline in clinical skills among trainees and practicing clinicians (Kern et al. 1985; Mangione et al. 1995; Mangione & Nieman 1999; Mangione 2001; Vukanovic-Criley et al. 2006), we might be allowing the blind to lead the blind. Allowing those whose clinical skills are not of the highest level to teach junior trainees will perpetuate bad technique, poor recognition of abnormal findings, inability to interpret their significance leading to lack of application in daily patient care. Institutions should actively recruit recently retired clinicians with excellent clinical examination skills to teach trainees, many of whom have trained before the era of obsession with high technology medicine.

The University of Washington underwent a major curriculum reform for teaching its students clinical skills in response to problems identified during needs assessment as well as problems reported about clinical skills of trainees nationwide (Goldstein et al. 2005). They established the college system with a core group of clinical teachers who committed a substantial portion of their time to teach and mentor medical students, as well as develop and assess the curriculum. They developed explicit benchmarks for teaching core clinical skills. They identified a core of expert teachers, ensured

**Table 1.** Suggested recommendations to enhance physical examination teaching.

Institutions	Teachers	Content
The best for the job	Acquire bedside teaching skills	Integrate basic sciences into physical exam teaching
Structured curriculum	Improve demonstration skills	Incorporate evidence based physical exam
Staff development	Reinforce and update own physical exam skills	Encourage use of technology to corroborate exam findings
Assessment		
Elevate importance of physical exam in trainee education	Use multiple teaching methods and make it fun	
Clinical skills centres		

adequate financial support for their teaching activities, provided them with a teaching and mentoring role, gave them a key role in curriculum development, and created an environment that refocused the school's resources on teaching and evaluating core clinical skills. Their preliminary data indicate that their program enjoys remarkable success with their students and faculty alike.

### Tip 3

#### Establish a structured and longitudinal curriculum

Many professional societies have argued for the importance of teaching and evaluating clinical skills. But unpredictable patient exposure based on curricular needs may result in scant structured learning opportunities to acquire critical skills. Moreover, there are a variety of learning styles that different trainees use predominantly to learn. Therefore, a 'one size fits all' or a single structured type of educational approach would not enhance trainee ability to select and use specific history or physical exam skills for individual problems. To assure that essential physical exam skills are acquired, it most likely requires that both systematic instructional strategies (didactic and hands on) and repeated learning opportunities are available to reinforce learning (Allen et al. 1991).

Goldstein et al. (2005) at the University of Washington, felt it was necessary to have a 4-year integrated clinical skills curriculum and move away from the block based non-longitudinal traditional teaching of physical exam. In their curriculum, they delineated clinical competency domains for increasingly advanced levels with benchmarks clearly stated for each level of training. Such a longitudinal curriculum would also ensure that trainees continue to continuously learn clinical skills from basic to increasingly advanced levels building on what was previously learned. In the separated block curricula, students first learn normal exam, a few months later they are required to do a full history and exam on a patient most of which is not observed. During the third year clerkships, some attachments organize physical diagnosis sessions, others don't. This method does not enable recall or reinforcement of previously acquired skills and several assumptions of trainees' skills levels are held by faculty.

Issenberg & McGaghie (2002) state that a spiral curriculum<sup>1</sup> is a useful approach to teach PE for the following reasons:

1. There is an iterative revisiting of core clinical skills throughout the entire medical school curriculum;
2. Clinical skills are revisited at numerous levels of difficulty;
3. Clinical skills are related to previous skills;
4. The competence and self-efficacy of students increases with each visit to a skill.

### Tip 4

#### Integrate simulation with bedside learning

Using simulation can enable tutors to structure new learning opportunities, provide standardized and reproducible

experiences and create learner centred environments where mistakes are permissible (Dent 2001). Clinical skills centres also provide ample opportunities to assess teachers' clinical and teaching skills as well as trainees' physical exam skills. Instead of using clinical skills centres to teach systematic exam skills without reinforcing this in clinical practice, Kneebone argues that the 2 environments should be a continuum (Kneebone et al. 2004). He proposes a more integrated approach that bridges the 2 learning environments. Learners should be able to practice in a simulated environment to prepare them for experiences with real patients and also return to the simulated environment when they had identified a clinical need from their experiences with real patients. They can reinforce what was learned at the bedside by listening to abnormal heart and lung sounds etc using a simulator. Repetition would reinforce the learning and enable them to better detect and recognise abnormal findings in future patients. They would be able to go at their own pace, with sustained practice and feedback such that learning could be immediately applied to the real situation in the workplace.

### Tip 5

#### Teach it well: the 6 step approach

Educators from Denmark (Faarvang & Ringsted 2006) took the traditional 4-step approach to teaching procedural skills and expanded it to a 6-step approach to teach joint examination at their institution. These steps include the following and steps 0 and 5 were considered essential to effective teaching of physical exam:

0. assessing learners' needs and diagnosing their skill level;
1. the tutor demonstrates the procedure;
2. the tutor repeats the procedure and explains what is done;
3. the student instructs the tutor while he or she repeats the procedure;
4. the student demonstrates the procedure and explain what they do;
5. after observing learners in step 4, the teachers give feedback.

This principle is not specific for joint examination and can easily be applied to teaching examination skills for other groups of chronic patients with specific physical signs and symptoms. This approach should be included in institutional efforts at developing skilled teachers of clinical skills.

### Tip 6

#### Make it fun – The clinical detectives

Most of the other tips relate to the importance and relevance of teaching PEx in medical education today as well as educational strategies for effective teaching. In addition, teachers should reflect on methods to make the teaching fun. Methods to teach physical diagnosis include bedside rounds, advanced physical diagnosis courses, utilizing senior trainees as teachers,

evidence-based physical diagnosis, use of teaching OSCEs and web-based curricula. Organising a game like atmosphere such as quizzes, medical jeopardy, physical findings treasure hunt, making the session an exercise in medical detection, making predictions about results of investigations based on exam findings can make PEx teaching more interactive, more engaging and more fun. At our institution, we have implemented more systematic PEx teaching for our residents this year. We have used a variety of teaching methods to keep the interest level high. Such methods include twice a month bedside morning reports, a marked change from the sit down case based discussions; physical exam jeopardy sessions with participants divided into teams and prizes for the winning team; interactive case based lectures focusing on PEx; and clinical problem solving sessions focusing on clinical exam. All of the sessions have been very interactive and received well by our residents.

## Tip 7

### Increase and improve bedside clinical teaching

Bedside teaching provides the best forum for clinical teachers to demonstrate physical examination techniques and teach physical exam. Yet, the frequency of bedside teaching is reported to have decreased from an incidence of 75% in the 1960s to less than 16% in the 1990s (Shankel & Mazzaferri 1986; Ende 1997). PEx skills cannot be taught in a classroom and require the presence of a patient, real or simulated. Although many clinical teachers find this an intimidating mode of teaching that bares their own deficiencies, they need to realize that all of them possess a wide range of clinical skills that they can teach their junior and far less experienced trainees (Ramani et al. 2003). This is particularly true if the patients are purely the subject of a physical exam teaching exercise and participants of the exercise are not members of the clinical team providing patient care. Some common sense strategies combined with faculty development programs at individual institutions can overcome some of this insecurity and promote bedside rounds which can be educational and fun for teachers and learners alike. Many strategies have been recommended in literature by educators including a twelve tips article (Ramani 2003) and three-domain model based on teacher-patient and team interactions (Janicik & Fletcher 2003). The twelve tips article simplifies key strategies for effective bedside teaching and has categorized teaching behaviours as those that can be carried out sequentially before rounds, during rounds and after rounds.

## Tip 8

### Technology can help not hinder physical exam teaching

Trainees and faculty may feel that the physical examination is a subjective art when compared with the more objective laboratory tests and imaging information (Andersen et al. 2001). A possible solution is using technology to aid the teaching of PEx. Physical diagnosis teachers today also have

access to a wide variety of technological aids to enhance their teaching such as websites, CD-ROMs, simulators, videotapes, and infrared multiuser stethoscopes. Although technology has been often been described as a barrier to physical exam teaching, technology can actually be used to improve physical exam teaching, study the accuracy of physical signs and help clinical teachers discard those signs that have no proven value in diagnostic accuracy. The predictive value and clinical utility of many physical examination techniques and physical findings have been questioned and evaluated as illustrated in the the Rational Clinical Exam series in the JAMA journal. Continuing to study these issues will keep the teacher of physical diagnosis up to date and direct physical diagnosis teaching and evaluation to the clinically most useful techniques and findings (Ende & Fosnocht 2002).

## Tip 9

### Apply basic sciences to clinical exam

In their junior years, students prefer to see the relevance of the skills they are learning to what they learned in basic science, and how it will serve them in practice. In their senior years, students must continue to apply basic science to clinical medicine (Issenberg & McGaghie 2002). Physical examination, which is considered by many to be a cornerstone for clinical diagnosis relies on a solid foundation in basic sciences such as anatomy, physiology and pathology (AACA 2001). Where to inspect, percuss, palpate, and auscultate, as well as the proper analysis of physical findings during a physical examination, demand an anatomical foundation rooted in the following concepts: anatomical terminology, normal variation, three-dimensional relationships, functional and living anatomy, and most importantly, clinical anatomy (AACA 2001). Palpable bony landmarks provide important references for predicting underlying anatomy, eg the various valvular areas of the heart. Bones and bony landmarks are often used to define imaginary lines that serve as helpful references for estimating the location of underlying anatomical structures, eg the midclavicular line. Knowledge of neuroanatomy is essential to localise neurologic lesions based on exam and without knowledge of physiology, trainees cannot comprehend the mechanism behind the audibility of cardiac sounds and murmurs. Finally, knowledge of sciences such as pathology, immunology and microbiology is key in formulating differential diagnoses on conclusion of a physical exam.

## Tip 10

### Assessment drives curriculum

The use of standardized or simulated patients has, in many centres, become synonymous with the OSCE as an approach to the assessment of clinical competence. Little attention has been paid to when it is appropriate to use real patients (RPs) and when standardized simulated patients (SPs) should be used. Although RPs with stable clinical findings may be used,

in most assessments SPs without physical findings are employed. However, some medical educators have reported that the correlation between exam technique and diagnostic accuracy is poor (Szauter & Ainsworth 2006, Hatala et al. 2007a,b) and using SPs without physical findings may result in incomplete assessment of a trainee. Some factors needed to be attended to in planning assessment of clinical competence (Collins & Harden 1998):

1. what is being assessed, including the level of abnormality and level of interaction with the patient required;
2. the level of standardization required, with greater emphasis on standardization needed for high-stakes national examinations;
3. the logistics, including the availability and costs of real patients and trained simulated patients;
4. the context, for example, practice-based or formal examinations of the OSCE type;
5. the level of realism or authenticity required.

Thus, if detection of abnormal findings and diagnostic accuracy are to be assessed, real patients are needed and this is true for advanced level trainees whose exam technique alone cannot be used as a surrogate for accurate bedside diagnoses.

Another method that can be used to assess clinical skills in practice is the mini-CEX which consists of short bedside interactions of trainees observed and graded by faculty (Norcini et al. 2003). These can be formative and summative. Unfortunately, the quality of any assessment is dependent on faculty skills in history and physical exam, demonstration, observation, assessment and feedback and this has been a subject of some concern (Holmboe 2004). For all these reasons, staff development is crucial and institutions need to make an investment in the selection and training of their core clinical faculty as has been done very well by the University of Washington (Goldstein et al. 2005)

## Tip 11

Staff development: Teach the teachers clinical skills

It has been said that 'To advance the art and science in clinical examination, the equipment a clinician most needs to improve is himself.'

Several investigators have reported that the clinical skills of trainees has declined since the 1970s (Kern et al. 1985; Mangione et al. 1995; Mangione 1999, 2001; Vukanovic-Criley et al. 2006), it becomes evident that these generations of trainees now turned faculty are teaching newer generations. Further, increasing pressures on faculty and curricular time may be leading to decreased attention to the teaching of the physical examination as well as decreased opportunity for faculty to improve their own skills. Cox states that since a major task in clinical teaching is to help students collect clinical evidence, teachers must be skilled in demonstrating how to do it (Cox 1998). To become skilful, each teacher must practise

demonstration. To improve their skills teachers need to be observed during their teaching and provided with feedback on their effectiveness. And to be confident of the outcomes of effective demonstration, teachers must be sure that trainees have learned.

Providing periodic faculty development sessions to enhance their bedside teaching skills and to update them on new information about the utility (or lack of utility) of specific physical examination manoeuvres and findings would be very useful (Anderson et al. 2001). Residency program directors, chief residents, and other key clinical teachers should be encouraged to participate. Developing resident skill in physical diagnosis is critical, as they are the principal teachers of medical students and they need to be able to model these skills for students.

## Tip 12

Integrate into the institutional values

Clinical teachers often perceive that in the current culture of academic medical institutions, teaching is an activity without commensurate rewards, financial or non-financial, and teaching is often the ball that is dropped before clinical work or research. Overcoming the cultural barriers to teaching requires a department or institution-wide initiative (Anderson et al. 2001). Although this cannot be expected to occur overnight, a faculty leader can promote innovative solutions with the support of the department chair, the medical school dean's office, and residency or clerkship directors. Medical schools should reward the teacher of physical diagnosis by acknowledging teaching efforts through personal recognition awards, salary as well as time allocated to enable faculty to teach.

They should also provide protected time and administrative support to the directors of physical exam courses. Faculty should be given time to teach by commensurate reduction of their clinical duties during the course. They should be rewarded for physical diagnosis teaching by including this activity in consideration of promotion decisions. Institutions could create awards that specifically recognize faculty or residents with outstanding physical diagnosis skills and make available funds for purchasing physical diagnosis teaching materials such as CD-ROMs, simulators, audiotapes, and videotapes. Finally, faculty with an interest in research in physical diagnosis should be supported and encouraged with start-up funds.

## Conclusion

Physical examination is a key aspect of patient-physician interactions and a valuable contributor to accurate clinical diagnosis. There are many innovative ways to teach PE and it can be taught in a time efficient manner. Rather than being a barrier to improving clinical skills, technology can actually help establish accuracy of physical exam. The medical community should continue to study the precision of clinical findings and discard those exam manoeuvres that do not



contribute to patient diagnosis. Institutions should elevate the value of clinical skills teaching, appoint and fund core faculty to teach and provide staff development to improve both faculty physical exam skills as well as their PEx teaching skills. Diligent attention to teaching PEx exam may reverse the trend of deficient clinical skills among generations of medical trainees and put the patient back into patient care.

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## Notes on contributor

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