Susan Wearne

Teaching procedural skills in general practice

Background

General practitioners need the skills to perform a core set of procedures. The increase in community based medical education gives GPs more opportunity and responsibility to facilitate medical students and junior doctors' acquisition of these core skills.

Objective

This article summarises how procedural skills are learned and describes a practical framework for constructing a supportive learning environment that is safe for patients and learners.

Discussion

Procedural skills are learned in stages starting with a 'big picture' concept of the skill and its place in clinical care. Next the skill becomes fixed through deliberate practice with specific, constructive feedback based on observation. Autonomous practice is reached after further practice and exposure to increased complexity. General practitioners can facilitate skill development by using a staged learning cycle, building on their learner's prior knowledge and skill.

Keywords: general practice; teaching; diagnostic techniques and procedures; clinical competence; therapeutic techniques and procedures

'See one, do one, teach one' and its variant 'do one, teach one' were the historical approaches to learning procedural skills in medicine. But who would fly with an airline that used this method to teach their pilots? 'See one, do one, teach one' may produce a doctor who knows how to do a procedure in one setting (procedural knowledge).[1] But it fails to provide extensive practise in learning manual tasks with varying contexts and complications,[2] or engender the wisdom to know when to do what (strategic knowledge)[3] or promote the acquisition of the appropriate values and attitudes of a professional (dispositional knowledge).[1]

In the past, procedural skills were learnt in hospitals. The increase in community based medical education[4] brings with it an increasing role for general practitioners to teach procedural skills.

Sylvester et al,[5] in their article, 'Procedural skills in general practice vocational training – what should be taught?' (see this issue of *AFP*) have identified a core set of procedural skills for GPs which complement the curricula of The Royal Australian College of General Practitioners[6] and the Australian College of Rural and Remote Medicine.[7] This article aims to give GPs a framework for teaching these skills. The first section discusses how people learn skills and the second covers learning procedural skills while providing patient care.

Method

A critical review of the medical literature cited in MEDLINE from 1990 on learning and teaching technical and procedural skills, with particular focus on family or general practice, was conducted. The results of this review were synthesised with the author's experience of teaching procedural skills as a GP and teaching health professionals how to teach procedural skills as part of a postgraduate clinical education course.

Learning procedural skills

Learning in phases

It is useful to think about the process of learning procedural skills occurring in three phases: cognitive, practice fixation, and autonomy.[8] This can be applied to the familiar – yet nonmedical – example of learning to drive. Initially the learner needs a concept of the car's function as a mode of transport and then the teacher constructs 'deliberate practice'.[9] The practice of sitting in

the car and driving under supervision fixes in the brain the mechanical sequences required, such as steering and changing gears. An expert observer gives constructive feedback to ensure learners develop accuracy and 'good habits', as 'bad habits' are hard to unlearn. After considerable practise and graded exposure to complexity, such as driving at night or when it is raining, the learner achieves competent autonomy. The manual skills are now subconscious, thereby creating spare brain capacity for the driver to, for example, have a conversation with passengers.

Expert drivers, like expert proceduralists, operate subconsciously. When experts teach they literally need to 'think' about something for the first time in years. Articulating subconscious actions can be surprisingly hard work, but it is less disconcerting when the reason for this is appreciated.

Learning in simulation centres

Simulation centres now contribute significantly to the learner's preclinical exposure and understanding of procedural skills including teamwork and communication.[10,11] This is welcome as there is evidence of some skills transfer to clinical practice,[12] however GPs teaching learners trained in simulation should be aware of two factors. First, competence in a simulation centre does not automatically or predictably transfer to competence in clinical practice,[13,14] as even those competent in simulated settings can struggle when faced with the reality of a patient in distress and the risk of a procedure causing further pain and complications. Second, students self assessed confidence and competence in a simulated procedure can outweigh their performance on objective testing.[15]

Teaching procedural skills in general practice

Stages in teaching procedural skills

Walker and Peyton's[16] four step process came from teaching in theatre and is commonly used in simulation centres and short courses teaching procedural skills.

The four step process

1. Demonstration: the teacher performs the skill at normal speed without commentary
2. Deconstruction: the teacher performs the skill slowly with commentary
3. Comprehension: the learner instructs the teacher who performs the skill
4. Performance: the learner performs the skill, articulating the key steps before doing them.

George and Doto[17] add a prior step of an overview of why the skill is needed and useful in healthcare. These stepped processes link to the stages of learning procedural skills. The first stage of demonstration and overview provides the learner with a concept of the whole skill. Observation may give the learner a chance to see and think about motor coordination patterns, or the effectiveness of different approaches, at a higher level of thinking than would be possible if simultaneously doing a task.[18] The next three stages provide a structure for 'practice fixation'. The deconstruction phase enables the learner to see which specific steps are needed and in what order. The comprehension phase gives the learner a chance to articulate these steps and imprint the order in their mind before the final phase of actually performing the skill. Repeated performance under supervision is needed to develop expertise. Further observation of experts performing the task can increase expertise,[18] so learning skills is more appropriately cyclical than linear.

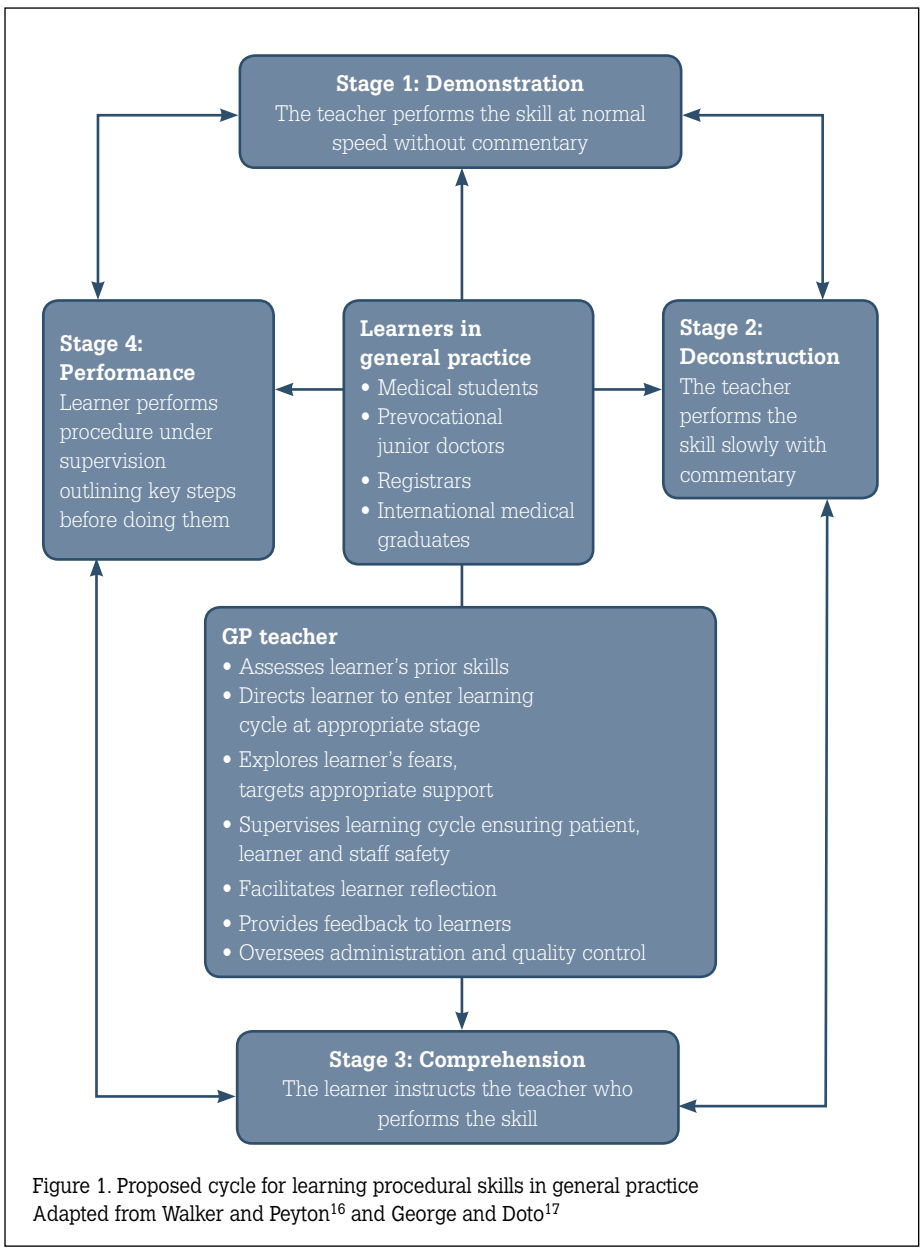

Figure 1. Proposed cycle for learning procedural skills in general practice
Adapted from Walker and Peyton[16] and George and Doto[17]

Criticisms of the four step process

The four step process can be criticised for being too slow and repetitive as it does not take into account a learner's prior knowledge and skills. Alternatively that it is too quick and its use in courses gives learners an illusion of competence without the repeated practise needed for safety. Although procedures were recorded as occurring at a rate of 16.7 per 100 general practice encounters,[19] the number of procedures means that the four steps can rarely be done in one session. Intriguingly, no empirical evidence for using this stepped process or alternative frameworks in general practice was located in the author's review. The proposed staged learning cycle shown in *Figure 1* has been developed from the author's experience and reading, for GPs to adopt, adapt and subject to rigorous study.

The four step process in practice

The four step process can occur in an episodic, longitudinal form or a fast track form.

Episodic, longitudinal four stage cycle

The four stages occur over time as clinical opportunities arise. The disadvantage of this longitudinal process is that the learner may not have a timely opportunity to consolidate their learning and therefore may have to start again each time. Adopting a practice wide approach to teaching helps learners gain exposure and experience more quickly than occurs by waiting for the designated supervisor to do a specific procedure.

Fast track four stage cycle

The teacher assesses the learner's competence of the procedure verbally using a skills log or results from a formal assessment. The mini-clinical examination is the most validated of the many available assessment tools.[20] A skills log should document the number and context of procedures given the variability of prior opportunity and experience,[21] how much supervision was needed and how much supervision is recommended in the future. The teacher starts the learner in the cycle at the appropriate stage to check and then build on their prior learning (*Table 1*).

For example, learners new to a procedure can gain a cognitive understanding (stage 1) by watching a video (on mute) of the procedure and then repeat it listening to any commentary (modified stage 2). Videos of procedural skills are available via the internet but the quality may vary: *gplearning*, Rural and Remote Medical Education Online (RRMEO), the *Canadian Family Physician* website and the *New England Journal of Medicine* website (subscription needed) are reputable sources. Another example is that a learner competent at a skill in a simulation centre could skip stage 1 and stage 2, and instead start by articulating the procedure in detail (stage 3) and then doing the procedure with the supervisor actively observing (stage 4).

Table 1. Author examples of using a four stage learning cycle to teach medical students Pap testing in general practice

Novice
Dave had no prior experience of taking Pap smears. With the patient's consent he observed the consultation with a woman due for a routine Pap test (stage 1). As I was writing up the notes I asked him to find duplicates of all the equipment I used. I then used the equipment to talk through (stage 2) the process of taking the smear. Over lunch I asked him to repeat back to me the process of taking the smear (stage 3). To consolidate his learning I suggested he watch a video of taking Pap smears, read the guidelines on cervical cancer screening and that he take home different sizes of speculum to practise tightening them singlehandedly. He transferred to a different placement where I hope he was able to gain some practical experience
Competent in simulation
Ellie requested the opportunity to perform a Pap test on a patient she had met earlier in her placement. Ellie said that the patient had given consent and that she had performed Pap tests on a mannequin in a simulation centre. I asked Ellie to tell me what she would need for the test and to describe the procedure (stage 3) while we set up the trolley. I met the patient and checked that she consented to seeing a student. Ellie watched me take a focused history and then I asked the patient if she would agree to let Ellie take the Pap smear. We both gloved-up, and Ellie inserted the speculum and took the smear under my supervision, outlining the key steps as she went (stage 4). I completed the consultation including arrangements for getting results, thanking the patient for her involvement and providing an opportunity to give the student feedback if she wished – she commented that Ellie had been gentle. I then asked the student to reflect on the procedure, outlining what she did well and what, if anything, she would like to do differently next time. Her reflections on the procedure mirrored my observation of a good technique that would become more accomplished with practise. My feedback was praise for successfully completing the procedure and encouragement to continue practising
Close to competent in practice
Alison was close to finishing a longitudinal community placement. She had observed multiple women's health consultations and procedures and had done several Pap smears. A patient booked to see her and Alison completed the history and prepared the equipment for the Pap test. She presented the history to me in front of the patient and I clarified two issues. We both gloved-up but Alison completed the procedure (stage 4) without any assistance. Alison finished the consultation, including documentation which I checked and signed. Alison used our feedback time to ask for tips on doing difficult Pap smears

The role of the GP teacher of procedural skills

The GP teacher ensures patient, learner and staff safety and manages the transition from learning in a laboratory or simulation centre to performance in clinical practice (*Table 2*). The GP teacher allows the learner to perform skills within the limit of their competency and patient consent. Over- and under-confidence need to be managed, and exploring any fears about performing the skill helps support to be appropriately targeted, as experts struggle to remember what it is like not to have a skill.[14] Skills can be extended under direct supervision with shared understanding that the teacher will intervene if patient safety is threatened. A consistent finding from motor skills research

Table 2. Practical tips for teaching procedural skills in general practice

- Book procedures at the beginning of consulting sessions so that learners and supervisors are available
- Use a checklist of equipment needed for each procedure, either devising your own or using one from a textbook[31]
- Check your equipment before starting and reinforce good practice by using universal precautions even if 'just practising'
- Actively involve all learners in a practice. For example, medical students can be asked to find the relevant equipment or describe how to set up a sterile field
- Use procedural log books (manual or electronic) to document a learner's competence and experience, including what level of supervision is recommended for that procedure in the future
- Learners learn more by doing than listening. A common pitfall in teaching procedural skills is for the teacher to talk too much. When practising, the learner needs all their brain power to focus on the procedural skill
- Make the most of the opportunities for practising skills. Questioning the learner about the indications for a procedure and its potential complications can be done at another time, away from the patient
- Cite past successes and failures judiciously. Stories can be great educators[32] but beware of using your teaching either to boost your ego or to provide space for catharsis about past disasters. Challenge yourself with whether the story you want to tell takes this learner to the next place on their journey, or is it a detour or diversion without educational benefit?

is that advice during a task is more likely to be effective if it is focused externally rather than internally on the learner. For example, suggesting a registrar makes sure the scalpel goes perpendicular to the skin is likely to be more effective than telling her to hold her hands up higher.[22]

Once the procedure is complete the teacher should create a supportive space that facilitates the learner's reflection on the procedure and provide constructive feedback based on specific observations.[23] Feedback from GPs is likely to be effective as they are a credible source and have ongoing relationships with their learners.[24] Feedback need not be exhaustive; the aim is not to tell learners everything that an expert knows as this can be counterproductive to learning. Instead, feedback should be carefully calibrated so that the learner feels in control,[22] motivated, and aware of the next step to develop their skills.[23]

Learners develop skills at different paces and in different ways. Some are naturally dextrous and can extend their skills by a gradual increase in procedure complexity,[25] while others benefit from prolonged practise. A simulation centre is useful if available, but low technical alternatives, such as suturing meat purchased from a shop or farm, work as well. If a learner is struggling, assessment of their learning style[26] and alteration of teaching technique to match the learner may help. Rarely a learner is not progressing and remediation in procedural skills is needed. This requires liaison with the learner's educational organisation.

Much of this article has focused on ensuring learners develop the manual skills but this should not imply that this is enough on its own. Learners need to know when to do what, when to ask for help, when to refer, how to keep up-to-date, and to demonstrate professional values and attitudes.[27,28] These are useful topics for tutorials and workshops, however learners also gain from seeing how practitioners handle[28] and discuss such issues in the practice and within communities.[29]

Summary

General practitioners are expected to provide opportunities for students and junior doctors to learn procedural skills. 'See one, do one, teach one' is an inadequate model for skills teaching and an alternative framework based on the psychology of learning motor skills is proposed. This model 'works in practice' but needs formal evaluation. Teaching should build on the learner's prior experience and provide opportunity for deliberate practise until autonomous competence is achieved and maintained with ongoing practise. General practitioner teachers need to ensure that their learners perform skills demonstrating appropriate values and attitudes and knowing when to do what. The art of teaching skills is to provide the right mix of support and challenge[30] to foster each learner's skill, motivation and confidence, while providing quality clinical care.

Author

Susan Wearne BM, MMedSc, FRACGP, FACRRM, MRCGP, DCH, DRCOG, DFFP, GCTEd, is Senior Lecturer in Clinical Educator Development, Flinders University Rural Clinical School, and a general practitioner, Alice Springs, Northern Territory. susan.wearne@flinders.edu.au.

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correspondence **afp@racgp.org.au**