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Enhancing the one-minute preceptor method for clinical teaching with a DEFT approach

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Abstract

Few validated methods that are grounded in educational theory exist to effectively teach medical knowledge, clinical skills, and diagnostic reasoning to learners at different stages of medical training. The goal of this Perspective was to address potential gaps in clinical education pedagogy by modeling new concepts for teaching in the field of infectious diseases. Our approach involved synthesizing the relevant literature, identifying proven approaches, and enhancing an existing educational microskills model — the one-minute preceptor. Our strategy was to emphasize the essential core elements of the one-minute preceptor using a descriptive acronym — DEFT (Diagnosis, Evidence, Feedback, Teaching), meaning skillful — as a potentially helpful reminder to improve the quality of interactions between learners and preceptors. The need for learners to discuss risk factors, mechanisms of disease, and potential complications, and for preceptors to model analytical and diagnostic skills, was further illustrated using a practical example of a

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Authors' contributions

Drs Savaria, Min, Tunkel, Hirsh, and Michelow, and Ms Aghagoli conceptualized and designed the study, and reviewed and revised the manuscript. Drs Savaria, Min, and Michelow drafted the initial manuscript. All authors approved the final manuscript as submitted, and agree to be accountable for all aspects of the work.

Competing interest disclosures

The authors have no competing interests to disclose.

Ethical statement

Institutional review board approval was not required for this Perspective.

Supplementary materials

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teacher-learner interaction about a child with a respiratory infection. The one-minute preceptor/DEFT approach is experiential, adaptable, case-driven, and skills-focused, and also applicable to clinical training in other specialties.

Keywords

clinical education; teaching; skills; diagnostic reasoning; one-minute preceptor

Perspective

Learning in the clinical setting is an essential and rewarding component of physician training. Medical trainees learn cognitive, clinical, and professional skills by integrating knowledge and a critical understanding of biomedicine into the care of individual patients. Currently, the medical literature presents few validated methods for teaching clinical skills and diagnostic reasoning, and approaches vary widely across and within countries, institutions, and specialties.

In this Perspective, our aim was to identify and address potential gaps in clinical education pedagogy at different levels of clinical training. The field of infectious diseases (ID) is suitable for modeling new concepts in educational methods for several reasons: faculty development to enhance teaching effectiveness is considered a priority of the Infectious Diseases Society of America (Schwartz and Chin-Hong, 2017); knowledge and understanding of epidemiology, microbiology, pathophysiology, and therapeutics are rapidly evolving; distinguishing between infectious and non-infectious causes of disease can be challenging; and ID practitioners often educate other medical professionals and the public about new developments in ID. Furthermore, insights gained from educational principles in one field may be transferred to other medical specialties. To achieve our goals, we synthesized the relevant literature and refined an existing educational model, which we have illustrated with a practical example from the field of ID.

The Association of American Medical Colleges (AAMC, 2005) and other medical professional organizations, such as the American Board of Internal Medicine (ABIM, 2021) and the American Board of Pediatrics (ABP, 2021), offer content outlines that serve as a blueprint for certifying examinations, but do not provide guidelines for clinical teaching. Challenges to ensuring universal high-quality clinical education include the variable caliber of supervision, competing time demands for clinical educators, lack of guidance to link educational theory to practice, and differences in the variety of clinical cases that learners encounter. To address many of these diverse challenges, preceptors and learners would benefit from better harmonization of learning objectives, teaching skills, and the science of learning (Hirsh and Worley, 2013).

In this context, the emphasis of medical education has shifted from a didactic knowledge-based model to the acquisition and application of skills through experiential learning, active engagement, and competency-based assessments. Effective clinical education should ideally integrate training on diverse medical topics, critical thinking, clinical judgement,

and communication skills. To achieve this goal, preceptors will need specific guidance on effective teaching methods and the means to translate theory to practice.

We regard an ideal approach as one that would guide clinical preceptors to: 1) teach medical knowledge, clinical skills, and diagnostic reasoning in inpatient, ambulatory, or other educational venues; 2) actively engage learners in activities that promote synthesis and analysis of data, and generation of knowledge through ‘struggle’ and ‘risk taking’ in a non-judgmental environment; and 3) evaluate core competencies required of learners, including clinical-year medical students, residents/registrars, and fellows. An effective method should permit clinical preceptors to bridge educational theory and clinical skills training by means of time-efficient, context-aligned, flexible, and dynamic preceptor-learner-patient interactions (Garout et al., 2016; Mylopoulos et al., 2018).

In order to identify published educational methods that integrate the above characteristics, a comprehensive review of articles from the general medical and pediatric literature was conducted using the MEDLINE database. The clinical learning models identified included the one-minute preceptor (OMP) five microskills method (Neher et al., 1992), the SNAPPS (Summarize, Narrow, Analyze, Probe, Plan, Select) model of learner-centered precepting (Wolpaw et al., 2003), the Aunt Minnie model of learning pattern recognition (Cunningham et al., 1999), the RIME (Reporter, Interpreter, Manager, Educator) developmental framework for teaching/assessing clinical performance (Pangaro, 1999), the PARTNER (Partner with learner, Assess, Reinforce, Teach, New knowledge, Execute, Review) framework (Chirch et al., 2021; Miloslavsky et al., 2017), and preceptor teaching scripts (Gonzalo et al., 2013; Irby et al., 2004). A recent Best Evidence Medical Education review of the effectiveness of clinical teaching strategies concluded that the OMP and SNAPPS models were the only strategies that consistently improved the clinical knowledge and skills of learners — a significant advantage over the other mentioned frameworks (Pierce et al., 2020).

Our conclusion was that the OMP style of clinical teaching is most compatible with a preceptor-directed model in a busy clinical setting (Pascoe et al., 2015). First, the model is easy to learn and apply efficiently within the clinical workflow. As a preceptor-led strategy, it generally requires a single, relatively brief training session for the teacher; in contrast, the SNAPPS model requires both the preceptor and learner to study the method. Second, the OMP can be applied to learners with varying levels of knowledge and experience. Third, it has been credited for improving the teaching ability of faculty members and trainees, enhancing the quality of feedback, and satisfying learners’ preferences (Furney et al., 2001), whereas the SNAPPS model does not formally incorporate feedback in the teaching encounter (Wolpaw et al., 2003). Fourth, the OMP method is a flexible platform that aligns well with the principles of educational theory espoused by Bloom (Bloom’s Taxonomy of Educational Objectives) (Anderson and Krathwohl, 2001; Bloom, 1956), which describes the learners’ transition from passive memorization to the cognitive process of active learning, enabling them ultimately to direct their own education.

To assess the extent to which the OMP has been successfully disseminated, a focused search of the literature was performed using the following terms: “one-minute preceptor OR five microskills teaching method” in any language. As of July 1, 2021, the search yielded 75

articles from the medical, dental, nursing, and pharmacy literature since 1992, but none of these surveyed learners' or preceptors' awareness of, or preference for, this method of teaching. Therefore, the extent to which the OMP has been adopted and implemented remains unknown.

Recognizing the value of the OMP model, we aim to further promote it by emphasizing its essential core elements. We propose condensing it slightly from five to four steps, summarized by the descriptive acronym **DEFT (Diagnosis, Evidence, Feedback, Teaching)**, by combining two of the original microskills ('reinforce what was done right' and 'correct mistakes' — now summarized as 'feedback'). By de-emphasizing the temporal component suggested by its name (One-Minute), the term 'DEFT', meaning skillful, reminds the preceptor and learner of the stepwise microskills that can be completed in a time-flexible manner, usually in the order of several minutes.

In addition to this slight modification, we propose expanding the expectations for learners by highlighting their need to discuss **risk factors, mechanisms of disease, and potential complications**, thereby demonstrating their deeper understanding of epidemiological and pathophysiological concepts in ID. We also suggest that **role modeling** by the preceptor may help reinforce skills by acting as a behavioral and analytical model, representing the possible, and being inspirational (Morgenroth et al., 2015). The framework of DEFT is as follows:

1. **Diagnosis:** ask the learner to commit to a unifying or differential **Diagnosis**; explain predisposing conditions and risk factors, mechanisms of disease, and complications; or address a specific **Discussion** point if the diagnosis is self-evident.
2. **Evidence:** probe for supporting and opposing **Evidence** to evaluate the learner's knowledge and clinical reasoning.
3. **Feedback:** ask the learner to articulate self-**Feedback** about their own performance; then provide constructive, specific, and non-judgmental **Feedback** about the learner's effort and ability by reinforcing what was done well, and explain how to improve their performance in future (Hattie and Temperley, 2007). Feedback may include role modeling to demonstrate how to succinctly formulate an assessment and conduct skillful clinical reasoning.
4. **Teaching:** **Teach** a general principle or clinical 'pearl'; teaching may guide the next steps in patient management as well as the learning process.

The OMP/DEFT approach is simple, flexible, and experiential. This model can be used by preceptors and learners at any time point when they interact with patients: at admission, during hospitalization, and in the outpatient setting. If the diagnosis is evident, alternative relevant discussion points may be addressed using one of five focused questions: *who* (e.g. at risk population), *when* (e.g. temporal associations), *where* (e.g. geographic distribution of disease), *what* (e.g. recommended therapy), *why* (e.g. underlying cause), and *how* (e.g. mechanism of disease or complications).

Using the OMP/DEFT method, various competencies can be taught and evaluated, such as clinical knowledge, diagnostic reasoning, and recognition of disease patterns. This method may also support preceptors to assist learners in framing a clinical question using the 'patient, intervention, comparison, outcome' (PICO) model, which would be helpful for a subsequent search of the medical literature and independent learning activities (Richardson et al., 1995).

To illustrate the potential value of the OMP/DEFT skills-focused strategy, we present a sample interaction between a learner and preceptor discussing a child hospitalized with a suspected respiratory infection (Table 1). We align the principles of Bloom's educational theory with the steps in the educational process in the context of an ID case. We anticipate that this type of dynamic interaction would enable preceptors to provide targeted and clinically relevant feedback, educate learners about potential cognitive and implicit biases, locate new knowledge in the context of the broader medical literature, teach fundamental principles, and prepare learners to make clinical decisions in the face of ambiguity (Norman et al., 2017).

In summary, we propose enhancing the OMP with the DEFT method (**D**iagnosis, **E**vidence, **F**eedback, **T**eaching) for preceptors with diverse clinical experience and learners with a wide range of medical training, to advance medical knowledge, clinical skills, and diagnostic reasoning in the field of ID as well as other medical specialties. As the complexity of biomedicine continues to evolve, updated educational approaches are essential (Cervantes, 2020), and prospective studies are needed to validate clinical teaching strategies, such as the OMP/DEFT method.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1
Clinical vignette illustrating the DEFT approach for a child with a respiratory illness.

OMP/DEFT Method	Revised Bloom's Taxonomy of Learning Objectives *	Educational objectives	Preceptor	Learner
Case Summary		<ul style="list-style-type: none"> ● Obtain detailed infectious diseases history ● Perform physical exam ● Review laboratory tests and radiological images 	"Tell me briefly about your patient."	<p>"Jane is a 3-year-old female with no past medical history who presented with five days of cough, fever, malaise, and was admitted for acute hypoxic respiratory distress. She did not receive the flu vaccine this year.</p> <p>Physical exam revealed fever to 102°F, tachypnea, tachycardia, and oxygen saturation of 88% on room air. Lung exam revealed crackles and mild expiratory wheezes.</p> <p>Initial workup in the Emergency Department was remarkable for chest x-ray showing an infiltrate in the right lower lobe, and leukocytosis of 17,000/μL. Her hypoxia resolved with 1-liter/min of oxygen via nasal cannula."</p>
Diagnosis/ Discussion Get a commitment to a unifying or differential Diagnosis, or discuss a salient Discussion point if the diagnosis has been established	Remember new facts (knowledge) Understand the meaning of new information (comprehension) Apply knowledge to solve a problem (application)	<ul style="list-style-type: none"> ● Develop concise and informative assessment including epidemiological risk factors, pathophysiological and anatomic features, and potential complications 	"What do you think is causing this presentation?" "Okay, so what do you want to do for your patient?"	<p>"Based on the clinical presentation and focal findings on chest x-ray, I think this is most likely bacterial or viral pneumonia. It is not complicated by a pleural effusion and there is no associated hilar lymphadenopathy."</p> <p>"I am concerned she is septic from her respiratory infection and would like to obtain a blood culture prior to starting her on antibiotics."</p>
Evidence Probe for evidence that supports or refutes a diagnosis	Analyze complex concepts by breaking information down into smaller components and draw connections between them (analysis)	<ul style="list-style-type: none"> ● Interpret clinical findings, imaging studies, microbiologic or molecular tests ● Demonstrate understanding of risk factors, mechanisms of diseases, mediating factors and natural history of disease ● Contextualize in terms of population health and social determinants of health ● Recognize and anticipate complications of disease 	<p>"What information supports your diagnosis?" "What additional evidence do you need to narrow your diagnosis?" "What may have led to this infection?" "In severe cases, what complications might we anticipate?"</p>	<p>"Pneumonia is supported by compatible symptoms and signs, abnormal vital signs, hypoxia and focal infiltrate on chest x-ray. Influenza is possible because she did not receive the flu vaccine and wheezing was heard on examination.</p> <p>There are several other viral causes of pneumonia. Bronchiolitis is less likely because of the focal infiltrate on the chest x-ray. She is at risk of having COVID-19 because SARS-CoV-2 is circulating in the community and she has not been immunized.</p> <p>Although she is young, she still can develop severe clinical disease."</p> <p>"Single or multiplex PCR tests to diagnose respiratory bacterial and viral pathogens including SARS-CoV-2. A blood culture obtained before starting antibiotics may be useful if she has bacteremic pneumonia caused by <i>Streptococcus pneumoniae</i> or other bacteria."</p> <p>"It is important to find out if she completed her age-appropriate vaccine series; had a possible aspiration event; has underlying immunodeficiency, comorbid conditions, a congenital lung malformation, relevant travel history, exposure to animals or birds, pertinent family history, or history of contact with sick people including those with tuberculosis because this information may provide a clue to make a definitive diagnosis."</p> <p>"If she deteriorates further, a repeat chest x-ray or CT scan may reveal progressive pneumonia, a parapneumonic effusion or lung necrosis that will guide further management."</p>

OMP/DEFT Method	Revised Bloom's Taxonomy of Learning Objectives*	Educational objectives	Preceptor	Learner
<p>Feedback Reflect on learner's performance to direct future improvement</p>	<p>Evaluate the soundness of one's own work (evaluation) Create new ideas to solve a complex problem (synthesis)</p>	<ul style="list-style-type: none"> ● Solicit self-feedback from learner ● Provide constructive feedback to emphasize strengths or gaps in knowledge ● May model a succinct assessment with salient elements 	<p>“What do you think you did well in your presentation and what could be improved?” “I think you did a great job summarizing your case and presenting pertinent information that supported your diagnosis. You demonstrated an understanding about the different potential causes of respiratory diseases and complications in young children. I suggest you also propose which empiric antimicrobial agent you would use, and review the Pediatric Infectious Diseases Society clinical practice guideline for management of community-acquired pneumonia in children when you have time.”</p>	<p>“I think I covered the differential diagnosis well and explained possible underlying risk factors and complications of her infection. I am uncertain about the best approach to treatment.” “Thanks. I think the best approach would be to initiate therapy with a narrow-spectrum antibiotic such as ampicillin, while I await results from diagnostic studies.”</p>
<p>Teaching Impart a general principle or clinical pearl; guide next steps in management or learning process</p>		<ul style="list-style-type: none"> ● Select one or more germane topics to teach the learner 	<p>“That is a rational approach and is based on good evidence from the literature.” “Let's talk briefly about when to suspect an underlying medical disorder in a child with a respiratory disease” or “...how to select appropriate antimicrobials”</p>	

* Adapted from Anderson LW, Krathwohl DR. A taxonomy for learning, teaching, and assessing: a revision of Bloom's taxonomy of educational objectives. New York: Longman; 2001.