EDUCATIONAL DOWNLOAD

Turning lemons into lemonade: Teaching strategies in boarded emergency departments

Jeffery Hill MD, MEd[1] 🆔 🐦 | Meaghan Frederick MD[1] | Sally A. Santen MD, PhD[2,3] 🆔 🐦 | Olivia Urbanowicz MD[1] 🐦

[1]University of Cincinnati, Cincinnati, Ohio, USA

[2]University of Cincinnati College of Medicine, Cincinnati, Ohio, USA

[3]Virginia Commonwealth University School of Medicine, Richmond, Virginia, USA

Correspondence
Jeffery Hill, University of Cincinnati, Cincinnati, OH 45219, USA.
Email: jeffery.hill@uc.edu

BACKGROUND

Boarding of inpatients in emergency department (ED) beds presents unique challenges and opportunities for clinician educators.[1] Severe overcrowding of the ED and operational responses to boarding of inpatients leads to fewer ED patients seen per hour by residents in training, changes in acuity of patients seen by residents, and the potential for decreased learning.[2-4] Though the research to date on the educational impacts of boarding on ED residents has not shown decreases in In-training Exam (ITE) performance,[1] the result of decreasing number of patient encounters and decreased opportunity to practice the rapid task-switching skills that are required of attending ED physicians represents a significant threat to residency education.

Given that boarding of inpatients in ED patient care spaces is an international phenomenon[5] and that it is unlikely to substantively change without fundamental changes to the medical system,[6] educators need to adapt their teaching strategies to this new environment. The existing literature focusing on teaching in times of boarding outlines global attributes of effective teachers but often fails to delineate concrete strategies and solutions to teaching.[7,8]

Here we describe a set of educational strategies and opportunities that can be easily implemented to help teach learners in times of boarding. These teaching strategies were initially developed by the chief residents within our residency training program during the 2021–2022 academic year. The initial set of teaching strategies was vetted and refined by our department's teaching faculty and the residency leadership team to ensure that the strategies were rooted in an understanding of the existing literature, that they emphasized previously successful strategies within our institution, and that they were practical and feasible.

ADAPTIVE LEARNING OPPORTUNITIES

By decreasing the number of patients seen, boarding threatens emergency medicine (EM) resident education by limiting opportunities to expand resident medical knowledge through exposure to a wide variety of patient presentations. Successful strategies for teaching in times of boarding address this by identifying and highlighting the dynamic nature of ED patient presentations. While still attending to their needs, learners can engage with boarded patients in the ED to obtain brief histories, review the diagnostic evaluation they had in the ED, and review the diagnostic and therapeutic approaches taken by the inpatient team. Rather than waiting for educational opportunities to present during new patient encounters, educators can strategically cover specific topics or literature/guideline discussions while still maintaining a case-based format. Additionally, successful teaching strategies seek to capitalize on the knowledge and experience of all members of the health care team. By introducing near-peer learning in group rounding, case review, and procedural observation instruction, you can multiply the numbers of learners

TABLE 1 Handout 1: on-shift educational exercises by domain.

Medical knowledge

Learning from the present clinical environment

- "Walking the Board"—group rounding allowing residents to learn from active cases
  - Primary resident presents one learning point from the patient, +/– and literature to support current management
- Reviewing patients in the waiting room
  - Compare/contrast medical screening examinations and full evaluations
  - Ask residents to triage the waiting room according to their estimate of patient acuity, i.e., "which patient(s) would you want brought back next?"
  - Discuss appropriate workups
    - *Which tests are appropriate to order based on the information in the chart* vs. *which tests do you want to wait to order until you have additional information?*
  - Hypothesize disposition based on available information. The goal is to emphasize anticipatory planning in workflow through if–then statements *(if the initial workup is negative then what?)*
- Observe the resuscitation bay
  - Provide real-time discussion with junior residents (be sure not to be disruptive to the ED team running the resuscitation)
  - Areas of discussion include medical decision making, team dynamics, order of operations, dynamic differential diagnoses incorporating rapidly changing clinical data.

Case-based learning

- Teach through oral boards style cases—sources to consider:
  - Personal case list, helpful to reference classical presentations, rare disease, diagnostic dilemmas, and/or challenging resuscitations
  - TamingtheSRU.com/Annals-of-B-pod
  - EMSimCases.com
  - EM:RAP Daily Dose
- Interpretation of specific diagnostics (ECGs, CXRs, US, CT, etc.)
  - Consider having a bank of studies available to facilitate this discussion.

Gamification

- "Cash for Cases"
  - A game of targeted diagnostics. Each resident has $200 to "spend." They are presented with a case and must arrive at the correct diagnosis while "spending" as little money as possible. History and physical examination findings are free and diagnostic tests are increasingly expensive based on the complexity and diagnostic information they provide.
- Medical Scattergories
  - Choose a category and have the learners go one by one, naming items in that category until no more can be thought of
  - Examples—induction medications and dosages, nausea medications, pain medications, painless/painful eye complaints, causes of dyspnea.

Practical and procedural skills

Procedural competencies

- Use phantoms to review and practice core emergency medicine procedural skills
  - Examples: lumbar punctures, US-guided IVs, central lines, pericardiocentesis, etc.
- Educational Ultrasounds (USs)
  - With consent, perform educational USs on admitted patients boarding in the ED
  - Educational USs are USs that are not used for diagnostic purposes or medical decision making and are not billed to the patient. They should only be performed in the presence of confirmatory imaging performed during the same encounter (a consultative echo, a CT abdomen, a CXR, lower extremity venous duplex, etc.).

Practical skills and interdisciplinary learning

- Peripheral IV (PIV) line placement and troubleshooting
  - How to prep a line
  - How to use a pressure bag
  - How to draw off labs/blood a line
    - Discuss order of blood tubes to collect if placing IV
  - How to recognize and address infiltrated lines
- IV pump mechanics
  - How to program a pump, starting/stopping infusions, changing med rates, addressing and silencing alarms
  - How to clear air in the line
  - How to backprime into a syringe for bolusing medications
- Arterial lines
  - How to set up and zero an arterial line
  - How to troubleshoot an arterial line
- Ventilator mechanics
  - Initial set-up and programming (modes, rates, volumes, pressures)
  - Troubleshooting a ventilator and respond to ventilator alarms
  - Adjusting ventilators based on pathology (e.g., ARDS, COPD, asthma, trauma, lobectomy, heart failure) and hypothetical blood gas results.

Workflow, task management, and quality improvement

Operations

- Maximize ED patient volume by identifying and responding to patient-level and department-level operational barriers to care
  - Consider assisting with discharge of patients, drawing/sending labs, transport of patients to ED bed/radiology
- Assist with patient safety
  - Review charts of patients in the waiting room to assist with appropriate triage and initiate workups (as appropriate by institutional policies and capabilities). Junior residents performing this task should be supervised by a senior resident or an attending.
- Quality improvement
  - Identify inefficiencies on shift and propose solutions.

TABLE 1 (Continued)

Efficiency and workflow

- Optimize your EMR
  - Set up quick filters to find ED encounters, H&Ps, and discharge summaries
  - Prewrite chief complaint–based discharge instructions (frameworks that can be further tailored to the patient)
    - Discuss health literacy requirement for written communications with patients
  - Quick references to frequently referred clinics including office location and phone numbers
  - Build notes tailored to specific chief complaints (some examples below)
    - Stroke note with NIHSS, indications/contraindications for TNK built in
    - Dental pain note with reminders of "need to know" dental pathologies and a comprehensive oral exam built in (*must ensure that these are used as reminders and not passively charted*).
  - Discuss the benefits and risks of using order sets in the ED (e.g., stroke, sepsis, STEMI)
    - Consider building order sets for where preexisting institutional ones do not exist.
- Observe junior residents perform a focused "chart biopsy" and provide feedback on efficiently searching for pertinent history based on chief complaint
- Improve workflow efficiency using SMART goal setting
  - Example behaviors/targets: time in patient room, time spent charting, clustering "in-person" task to minimize travel time in ED, improving communication with nursing.
- Simulate high-level multitasking: "stop, drop, resuscitate"
  - Interrupt your residents workflow with a simulated critical patient (*ensure that this does not negatively impact actual patient care*)
    - Add a layer of complexity by asking them to run their board and discuss with the nurses the "next steps" that need to be completed while they are "in the resuscitation"
    - Be sure to debrief not only the case, but also the residents simulated handling of transition from pod care → resus → pod care, team communication, and efficiency.

Workflow, task management, and quality improvement

Quality documentation

- Review notes in detail
  - Is the note an accurate reflection of the encounter (free of inaccurate template defaults, comprehensive, logical, and orderly)?
  - Is documentation completed in a timely fashion?
  - Does it meet criteria for a level of billing appropriate for the complexity of care provided?
- Critical care documentation and billing
  - Review justification and indications for critical care billing
  - Ensure comprehensive documentation to justify critical care billing
- Discuss supervisory documentation
  - Supervision of APPs and residents
  - Supervision of procedures
  - Supervision of critical care.

Attending physician–level tasks

- Providing telephone medical direction
  - Listen to telemetry/medical direction calls and have learner independently formulate a plan
  - Simulate common medical direction call questions
    - Examples: termination of resuscitation, refusal of transport, medication orders, proper routing of EMS based on patient needs
- EMTALA considerations
  - What constitutes an EMTALA violation as the sending or receiving physician
  - How to determine level of care during transport.

Evidence-based clinical practice

- On-shift clinical questions
  - Have the resident propose a clinical question relevant to a patient they are seeing, ask them to do a brief literature search and present an article on the topic. Skills to focus on:
    - How to generate a focused search (PICO questions)
    - Where to find reliable sources
    - How to interpret results of a study
    - How to appraise the quality and validity of that study
    - If, how, and when to integrate the findings into your practice
- Ask residents to present a brief summary of the literature supporting their treatment plan as part of a patient presentation. Examples:
  - Heparin/aspirin in ACS
  - Thrombolytics in acute stroke
  - DKA treatment: insulin bolus vs. no bolus
  - Ankle pain: Ottawa Ankle Rule
  - Trauma: Nexus C-spine, Canadian C-spine, and Head CT rule
  - PERC and Wells' criteria in patients with chest pain
  - HEART score
  - Medications in ACLS, targeted temperature management
  - Local antibiograms and susceptibilities when treating infections
  - Initiating hypertensives and first-line choices.

Abbreviations: ACLS, Advanced Cardiovascular Life Support; ACS, acute coronary syndrome; ARDS, acute respiratory distress syndrome; COPD, chronic obstructive pulmonary disease; DKA, diabetic ketoacidosis; EMR, electronic medical record; EMTALA, Emergency Medical Treatment and Labor Act; HEART, history, echocardiogram, age, risk factors, and troponin; NIHSS, National Institutes of Health Stroke Scale; PERC, pulmonary embolism rule-out; PICO, patient/population, intervention, comparison, and outcomes; PIV, peripheral intravenous line; STEMI, ST-elevation myocardial infarction; TNK, tenecteplase; US, ultrasound.

engaged, encourage development of residents-as-teachers, and allow for knowledge transfer and emotional debriefing of similar cases.

Decreases in patients per hour seen by residents threatens EM resident education by limiting opportunities to develop the rapid task-switching skills that are needed to run an ED. Successful strategies that address this threat seek to create situations where rapid task switching can be simulated (see "stop, drop, resuscitate" in Table 1). Teachers can also encourage their learners to improve and perfect the base skills that lead to efficient patient care (e.g., electronic medical record optimization, efficient chart biopsy, workflow efficiency).

Additionally, successful teaching strategies during boarding seek to take advantage of increases in provider downtime. Teachers can use this time to hone procedural skills using high- or low-fidelity task trainers and to improve ultrasound (US) acquisition and interpretation skills by performing educational USs with patient consent on boarded inpatients. During periods of downtime, learners can practice evidence-based clinical practice skills, searching for and identifying literature based on the patient pathologies present in the ED. Learners can also use downtime to take advantage of opportunities for interdisciplinary learning. Residents can observe and be taught the skills of nonphysician health care providers (e.g., ventilator set-up and adjustment, obtaining ECGs, adjusting IV pumps, medication administration). Not only does this increase interprofessional respect and understanding but also enables learners to better understand the overall operations of the ED.

HOW TO IMPLEMENT AND BARRIERS TO IMPLEMENTATION

Many of the teaching strategies outlined are relatively easy to implement within a given shift without onerous impacts on either the teacher or learner (e.g., SMART goals for workflow efficiency, "walking the board," observing in the resuscitation bay). Some of the strategies may require additional preparation (e.g., making task trainers available for procedural training, preparing specific cases for presentation, medical Scattergories). For strategies that require additional time for supervising physician, it is encouraged to have a set threshold to start using them. This may be based on a department-wide boarding score (e.g., National Emergency Department Overcrowding Scale [NEDOCS] or number of boarded inpatients) or a patients-per-provider number. Having an agreed-upon threshold can help limit shift-to-shift variability in the utilization of these strategies. It may also be helpful if one senior-level provider is assigned to transition to a more educational role in the event of significant boarding. This person can scout valuable patient encounters from the boarding patients and serve as the facilitator of one-on-one learning with other health care staff. It is important to note that while these strategies can be helpful in maximizing learning opportunities on particularly boarded shift, teaching physicians should be very attentive to the changing operational state of the ED and ensure that these strategies do not negatively impact the throughput of active ED patients.

ORCID

Jeffery Hill https://orcid.org/0000-0001-8369-3022
Sally A. Santen https://orcid.org/0000-0002-8327-8002

TWITTER

Jeffery Hill _drjeffy
Sally A. Santen ssanten
Olivia Urbanowicz orurbanowicz

REFERENCES

1. Shayne P, Lin M, Ufberg JW, et al. The effect of emergency department crowding on education: blessing or curse? *Acad Emerg Med*. 2009;16(1):76-82. doi:10.1111/j.1553-2712.2008.00261.x
2. Jen M, Goubert R, Toohey S, Zuabi N, Wray A. Triage physicians in an academic emergency department: impact on resident education. *AEM Educ Train*. 2021;5(3):e10567. doi:10.1002/aet2.10567
3. Kirby R, Robinson RD, Dib S, et al. Emergency medicine resident efficiency and emergency department crowding. *AEM Educ Train*. 2019;3(3):209-217. doi:10.1002/aet2.10327
4. Mahler SA, McCartney JR, Swoboda TK, Yorek L, Arnold TC. The impact of emergency department overcrowding on resident education. *J Emerg Med*. 2012;42(1):69-73. doi:10.1016/j.jemermed.2011.03.022
5. Somma SD, Paladino L, Vaughan L, Lalle I, Magrini L, Magnanti M. Overcrowding in emergency department: an international issue. *Intern Emerg Med*. 2015;10(2):171-175. doi:10.1007/s11739-014-1154-8
6. Kelen GD, Wolfe R, D'Onofrio G, et al. Emergency department crowding: the canary in the health care system. *NEJM Catal Innov Care Deliv*. 2021;5, 1-26. doi:10.1056/CAT.21.0217
7. Bandiera G, Lee S, Tiberius R. Creating effective learning in Today's emergency departments: how accomplished teachers get it done. *Ann Emerg Med*. 2005;45(3):253-261. doi:10.1016/j.annemergmed.2004.08.007
8. Lin M, Taira T, Promes S, Regan L. Educational excellence in a crowded emergency department: consensus recommendations from the Council of Emergency Medicine Residency Directors 2010. *J Grad Med Educ*. 2011;3(2):249-252. doi:10.4300/jgme-d-10-00137.1