

FACULTY DEVELOPMENT

A workshop to improve workflow efficiency in emergency medicine

Raghu Venugopal, MD, MPH;* Eddy Lang, MDCM;* Ken Doyle, MD, MBA;* Douglas Sinclair, MD;† Bernard Unger, MD;* Marc Afilalo MD*

ABSTRACT

Objective: The emergency department (ED) environment requires physicians to focus on workflow efficiency (WFE) and manage ED throughput. We sought to determine whether an interactive workshop could be designed and favourably perceived by emergency physicians and residents as a means to improve their self-assessed WFE skills.

Methods: The authors designed a 4-station workshop to simulate key components of ED throughput. These included resource management in 1) acute care, 2) minor care, 3) charting and 4) communication skills and patient sign-overs. Anonymous surveys were completed after each workshop using 5-point Likert scales and qualitative responses. Qualitative data encompassed participants' past WFE training experiences and perspectives on the current workshop. Data were analyzed using descriptive statistics. The workshops were administered on 2 separate occasions to different groups of physicians. The first occasion was primarily for residents and the second session was only for practising physicians.

Results: A total of 22 residents and 24 practising physicians participated. Evaluations were completed by 45 of 46 participants. Ratings of "definitely helpful" or "helpful" as noted for each station were received by 37 of 44 respondents for the sign-over and communication station, by 37 of 44 for the minor care station, by 41 of 44 for the acute care station and by 33 of 43 for the effective charting station. Among all participants, 42 of 45 reported that they felt the overall workshop experience was "helpful" or "definitely helpful."

Conclusion: ED management "flow skills" are valued yet undertaught. A flow workshop designed to improve self-perceived WFE skills yields positive evaluations. Teaching this competency in a workshop setting is both feasible and appreciated by participants. Similar efforts should be considered for inclusion in both graduate and continuing medical education curricula.

Keywords: patient flow, physician practice, emergency department overcrowding

From the *Department of Emergency Medicine, McGill University, Montréal, Que., and the †Department of Emergency Medicine, Dalhousie University, Halifax, NS

Related presentations: This study was presented in poster format at the Canadian Association of Emergency Physicians Annual Meeting, June 2–6, 2007, Victoria, BC, and in poster format at the Annual Meeting of the Society for Academic Emergency Medicine (SAEM), May 18–21, 2006, in San Francisco, Calif., where it won the SAEM Innovation in Emergency Medicine Exhibit Award.

Related abstract published: Venugopal R, Lang E, Doyle K, et al. Can efficiency be learned? A novel workshop to improve physician productivity and emergency department flow. *CJEM* 2007;9:205.

Submitted Dec. 5, 2007; Revised May 30, 2008; Accepted May 31, 2008

This article has been peer reviewed.

CJEM 2008;10(6):525-31

RÉSUMÉ

Objectif : Dans les urgences, les médecins doivent se concentrer sur l'optimisation du flux de travail (OFT) et la gestion de la prise en charge des patients. Nous avons cherché à déterminer s'il serait possible de concevoir un atelier interactif qui aiderait les médecins d'urgence et les résidents à améliorer leurs compétences auto-évaluées relatives à l'OFT et qu'ils accueilleraient favorablement.

Méthodes : Les auteurs ont conçu un atelier comportant 4 postes pour simuler des éléments clés de la prise en charge des patients en salle d'urgence. Il s'agissait notamment de la gestion des ressources pour 1) les soins aigus; 2) les soins mineurs; 3) la tenue des dossiers; 4) les compétences en communication et le transfert des patients. Les participants ont rempli des questionnaires dans l'anonymat après chaque atelier. Les réponses étaient qualitatives et exprimées selon des échelles de Likert en 5 points. Les données qualitatives englobaient l'expérience antérieure de formation en OFT des participants et leurs points de vue sur l'atelier en question. On a analysé les données en utilisant des statistiques descriptives. Les ateliers ont eu lieu à 2 occasions pour 2 groupes distincts. Le premier atelier était principalement pour les résidents et le deuxième était réservé aux médecins actifs.

Résultats : Au total, 22 résidents et 24 médecins ont participé. Quarante-cinq des 46 participants ont rempli les évaluations. Les cotes « vraiment utile » ou « utile » ont été accordées par 37 sur 44 répondants pour le poste de soins mineurs, par 41 sur 44 pour le poste de soins aigus et par 33 sur 43 pour le poste de tenue efficace des dossiers. Parmi tous les participants, 42 sur 45 ont indiqué qu'ils estimaient que l'atelier était dans l'ensemble « utile » ou « vraiment utile ».

Conclusion : Bien que l'on reconnaisse l'importance des compétences en gestion du flux de travail dans les urgences, elles ne sont pas enseignées. L'atelier sur le flux de travail conçu pour améliorer les compétences auto-évaluées en OFT a été bien accueilli. L'enseignement de cette compétence dans un atelier est à la fois réalisable et apprécié des participants. Il serait souhaitable d'envisager d'inclure des ateliers analogues dans les programmes d'études supérieures et de formation médicale continue.

Introduction

Emergency department (ED) care today takes place in an era of ubiquitous overcrowding, where workflow efficiency (WFE) skills are a key competency in emergency medicine (EM). Closely associated with WFE is the notion of ED throughput, which we define as the management of patients from their physical entry to physical exit from the ED. Yet little emphasis is placed on formal training in this skill set outside of the ED setting. We define WFE as the ability to manage multiple ED patients and, through multi-tasking and strategic interventions, expeditiously make treatment and disposition decisions without compromising safety, quality of care, staff relations or documentation.

The American Board of Emergency Medicine Model of Clinical Practice states that a core EM task is that of “multi-tasking and team management” whereby physicians must “prioritize multiple patients in the ED in order to provide optimal patient care; [and] interact, coordinate, educate, and supervise all members of the patient management team.”¹ Similarly, the Royal College of Physicians and Surgeons of Canada, through its CanMEDS framework, promotes 7 core competencies for every EM graduate.² These “Objectives of training and specialty training requirements”

include being a communicator, collaborator and manager — all essential traits required to run a busy ED.

Lacking these skills compromises efficiency and safety. Using qualitative methods, Apker and colleagues³ found that poor communication and collaboration in the transfer of care from the ED physician to the hospitalist created a “gray zone” of ambiguity that was believed to contribute to greater ED boarding times and compromised patient safety. In response, they suggested that EM educators 1) ensure trainees develop appropriate communication skills, 2) role model these skills and provide supervised training and 3) provide interactive exercises that focus on effective communication along with feedback from experienced physicians. This novel workshop implements these recommendations and provides quantitative and qualitative data on its perceived impact.

EM residents are encouraged to be more efficient as their training progresses and yet are rarely offered formal training to explicitly achieve this goal. Nonetheless, research evidence suggests that EM resident WFE increases with each year of training.^{4,5} WFE is often only established upon graduation as an attending physician, by emulating colleagues or through peer pressure or mentorship. In response to these needs, experienced physicians and the

American College of Emergency Physicians have published strategies to improve WFE during ED shifts and to improve care during patient handovers.⁶⁻⁹ Yet there is little in the literature to guide educators on whether or how this competency could be taught in a manner that complements clinical training. Emerging computer simulation models to improve flow management by residents may prove a useful methodology.¹⁰ We hypothesized that this workshop would be perceived to fulfill an unmet need among residents and practising physicians. We further hypothesized that the workshop would be viewed as a helpful experience imparting skills that could improve the efficiency of clinical care. The purpose of our study was to evaluate an interactive workshop to improve WFE skills that was designed, implemented and evaluated as separate sessions for both EM residents and practising EM physicians. Our goals were to

1) investigate whether needs existed for WFE skill development, 2) address those needs by developing educational content and delivery methods, 3) pilot developed educational methods in 2 interactive workshops and 4) evaluate the impression of participants.

Methods

After surveying the English language EM literature using MEDLINE, 5 board-certified EM specialists and 1 EM resident designed 4 hands-on workshop stations to model components of ED WFE. These included strategic resource management within both acute and minor care settings as new patients arrived in a congested ED, at 2 distinct stations: 1) charting and communication skills using a case-based model and 2) effective and succinct patient sign-overs of

Table 1. Specific activities at each interactive station

Station	Description
Nightmare sign-over: communicating with colleagues	This station emphasizes the synthesis of a large amount of information into an organized package during sign-over or consultation. The person receiving the sign-over will need to push " their colleague to give them the information they need for optimal patient management. One-half the participants are given 5-10 pre-prepared ED case studies at various stages of their management. The first participant will sign over their patients to a receiving MD. Following this exercise the participants will critique their own performance by noting the essential sign-over points in a group discussion with an expert faculty physician.
Minor care meltdown: efficiency and optimal space usage in ambulatory care	This station emphasizes the optimal use of space within the minor care area. A participant inherits a congested ED (depicted on a simplified floor plan or "game board") and must create space to work by optimizing the placement of existing patients and family members. The participant must then tackle a dozen actual triage sheets with varying chief complaints. The participant is provided with a number of rooms, chairs, hallway spaces and a waiting room. There is a unit clerk, an orderly, 2 nurses, a junior resident and a medical student who need coordination. To discharge patients the faculty expert provides facilitating information. Following the participant, the faculty and other participants provide feedback on how they would approach the situation.
Flying gurneys: thinking ahead about stretcher patients	This station emphasizes the efficient care of nonambulatory patients. The participant must orient themselves to a busy acute care area with a limited number of monitored beds, which are initially being used in a nonoptimal manner. The participant is provided a physical "game board" of the acute care area. They must then place patients arriving by ambulance and manage existing patients. The participant is prompted by the faculty to suggest an empirical management strategy for patients. If the participant manages patients well they evolve into a state possible for disposition. The mix of pathology is adjusted depending on the participant's practice environment.
ED writer's cramp: efficient charting, reassessments and consults	This station emphasizes written communication skills through the real-time production of meaningful, brief, legible and defensible charts. Participants are given actual ED charts and are presented with typical scenarios. Participants chart their initial encounter and follow-up notes as the case evolves. Participants are afterwards debriefed on the main purposes of the ED chart, the causes of inefficient charting, the means to improve charting and tips on consulting. A case is again presented and participants seek to improve their charting as well as fill out a focused request for consultation.

ED = emergency department; MD = medical doctor.

mock cases to a colleague. Each station allowed 1 or more participants to engage in simulating key WFE skills using a clinical scenario format led by a senior clinician.

The precise activities within each 30-minute station are described in Table 1. Fourteen experienced board-certified EM physicians selected for their ability to manage a busy ED were recruited to run each station. Two relevant articles by Campbell and Sinclair,⁶ and Denny and coworkers⁷ were provided to participants beforehand. A plenary session was held before participants proceeded through the stations in order to orient them to the objectives and structure of the workshop, as well as to discuss previously published strategies to improve WFE. A wrap-up session moderated by faculty served to elicit feedback on major learning points. Images of the 2 workshops in-progress as well as game boards used for 2 of the stations can be found at www.mcgill.ca/emergency/flow-workshop/.

Positive feedback after a first workshop experience that was organized primarily for residents led to a second workshop being offered to practising EM physicians. After each workshop, anonymous surveys were completed using 5-point Likert scales and analyzed with the use of descriptive statistics. Qualitative responses were merged and summarized. Quantitative responses to both workshop exercises are presented as descriptive analyses.

Results

Among the 46 participants, 22 were EM residents and 24 were practising EM physicians. Written evaluations were

completed by 45 of 46 participants. Resident experience averaged 2 (range 0.5–4.5) years and EM physician experience averaged 10 (range 2–27) years. The first workshop involved 14 faculty EM physicians, and the second workshop was streamlined and only required 4 faculty physicians, most of whom had previous facilitation experience for this content.

As illustrated in Table 2, ED WFE skills as part of training or professional development were rated “very important” or “somewhat important” by 40 of 45 participants. In contrast, only 17 of 45 felt it had been “somewhat taught” or “well taught” during their training (Table 3). One physician with 22 years of experience noted “flow was not much of an issue” during the time of his training. Ratings of “definitely helpful” or “helpful” were provided by 37 of 44 respondents for the sign-over and communication (“Nightmare sign-over”) station, by 37 of 44 for the minor care management (“Minor care meltdown”) station, by 41 of 44 for the acute care management (“Flying gurneys”) station and by 33 of 43 for the effective charting (“ED writer’s cramp”) station (Table 4). Among all participants, 42 of 45 felt the overall workshop experience to be “helpful” or “definitely helpful” (Table 5).

Written evaluations by 15 of the 18 faculty instructors indicated that they had a mean of 14 (range 2–22) years’ experience. All of the faculty members indicated that they felt teaching residents WFE skills was “very important” or “somewhat important,” and none were unsure or felt this topic to be “unimportant” (data not provided). None indicated that skills related to WFE in their own training were

Table 2. Self-reported importance of workflow efficiency training in prior professional development

Workshop	Very important	Somewhat important	Not sure	Unimportant	Irrelevant
Resident workshop	23/31	4/31	3/31	1/31	0/31
Staff workshop	7/14	6/14	1/14	0/14	0/14
Total	30/45	10/45	4/45	1/45	0/45

Table 3. Self-reported quality of teaching of workflow efficiency skills during professional development

Workshop	Yes, well taught	Yes, somewhat taught	Not sure	No, not taught
Resident workshop	3/31	10/31	7/31	11/31
Staff workshop	2/14	2/14	2/14	8/14
Total	5/45	12/45	9/45	19/45

“well taught.” All faculty indicated they would participate in the workshop again and 11 of 14 felt the experience was useful.

Qualitative responses from participants and faculty suggested that more time, up to 45 minutes, be allotted per station with 30 minutes reserved for the wrap-up. This would allow more participants to be in the “hot seat” position of being the simulated ED physician and actually practising the WFE skill in question. More time for group brainstorming opportunities was cited as important, not just at the end of the workshop, but after each station. Some participants felt strongly that the event should be expanded and formally incorporated into EM education.

Discussion

ED flow is the culmination of input, throughput and output of patients. We often cannot easily control prehospital input or ED output because of issues like unpredictable volumes acuity and bed block, respectively. Patient throughput, however, can be expedited by a collection of what we coin as “flow skills” or WFE. These skills have traditionally been experientially and passively acquired, but in the era of ED overcrowding there is a strong argument for actively teaching WFE. Central to this notion is the idea of moving away from a time when physicians learned to manage the ED through “baptism by fire”; rather they have become savvy traffic cops who can untangle and prevent

gridlock. Although some of our participants perceived “flow as an art,” we believe it is equally a collection of skills that can be described, taught, researched and replicated.

Responses from both participants and teaching faculty indicated that whereas this is an important area for professional development, very few had received adequate WFE training. Evaluations indicated a high level of support for the utility of this 3-hour workshop after they had engaged in its 4 interactive stations. We feel this advances the novel idea proposed by Denny and colleagues⁷ of designing and implementing an “efficiency curriculum” for EM residents.

We learned that conducting this innovative workshop required modifications related to participant background. For example, for the sign-over station, which included both rural and urban physicians from across Canada, it was important to have the time to compare different strategies employed in both contexts. Moreover, the interaction was important since even experienced physicians have much to learn from each other. One faculty member who was running the charting station indicated, “Remarkably, the best tips came from the audience.” Another physician with 10 years’ experience remarked that 2 types of WFE workshops should be developed — 1 for new graduates and 1 for experienced physicians.

Adjustment is needed for some community physicians who run smaller EDs where a mix of acute and ambulatory patients occupy the same physical space; this is a different

Table 4. Evaluation of interactive stations

Workshop	Definitely helpful	Helpful	Neutral	Unhelpful	Definitely unhelpful	No response
Nightmare sign-over	17/44	20/44	4/44	3/44	0/44	1/45
Minor care meltdown	26/44	11/44	6/44	1/44	0/44	1/45
Flying gurneys	23/44	18/44	2/44	1/44	0/44	1/45
ED writer’s cramp	14/43	19/43	9/43	1/43	0/43	1/44

ED = emergency department.

Table 5. Overall evaluation of the entire workshop

Workshop	No. (%) of participants				
	Definitely helpful	Helpful	Neutral	Unhelpful	Definitely unhelpful
Resident workshop, <i>n</i> = 31	22 (71)	8 (26)	1 (3)	0 (0)	0 (0)
Staff workshop, <i>n</i> = 14	6 (43)	6 (43)	1 (7)	1 (7)	0 (0)
Total, <i>n</i> = 45	28 (62)	14 (31)	2 (4)	1 (2)	0 (0)

situation than that found in many urban EDs, which are often divided into acute and minor care areas. Differing clinical skills and EM expertise among participants proved helpful. Clinicians with more experience and ability were able to make better WFE decisions and mentor other participants.

Each scenario raised specific learning points which are summarized in Table 6. Clinicians at the sign-over station indicated that signing over cases was fraught with risk. As noted by Singer and Dean,⁹ a systematic method for handing over should be agreed upon by colleagues (e.g., everyone “clean up” their own cases and thus take on fewer new patients as the end of shift approaches). The transfer of

care also should consist of the communication of a “synthesis” rather than a data collection exercise. Likewise, when a poor sign-over is received, the physician assuming care should not hesitate to “challenge what is given,” as one faculty member wrote. In other words, the physician assuming care should ask their colleague to revise their impression and plan. Another faculty participant commented there should be a “clear plan for the patient even if the work-up is in progress.”

The acute care station illustrated that there should be rational reasons for placing patients on stretchers or in monitored beds as this is a strained resource. As well, both the acute and minor care stations illustrated that in the current

Table 6. Summary DOs and DON'Ts of emergency department flow taught in each of the 4 stations

The “DOs” of ED flow	The “DON'Ts” of ED flow
Station 1: Sign-over: communicating with colleagues	
Do: ensure sign-over is a synthesis of clinical information. Do: sign-over limited important objective information (e.g., lactate). Do: seek an agreed upon end-of-shift strategy, (e.g., stop seeing new patients in your last 1 hour). Do: ensure as the incoming EP that you identify information gaps that the signing over MD should address before leaving. Do: ensure sign-over always includes disposition and decisional elements (e.g., if troponin negative, then discharge home).	Don't: make sign-over simply a restatement of the medical record. Don't: see new complex patients who can wait at the expense of reassessing and packaging your current patients.
Station 2: Minor care: efficiency and optimal space usage in ambulatory care	
Do: ensure as physician in charge you facilitate all aspects of care that impact on flow. You must lead the team. Do: promote teamwork and appropriate delegation of tasks. Do: ensure constant turnover of patients without redundancy (e.g., try to get urine and bloods at same time). Do: use your knowledge of the availability of hospital resources to guide your decision making. Do: make a space for rapid reassessments and minor cases. Do: anticipate what is coming — screen the incoming charts and have a strategy for how to stream-line their care.	Don't: place a patient in an assessment area that usually turns over quickly if they require a prolonged stay.
Station 3: Acute care: thinking ahead about stretcher patients and optimizing reassessments	
Do: carefully select which patients require telemetry based on available evidence, local practice and clinical judgment. Do: keep an eye on triaged patients — anticipate incoming patients and a need for space. Do: insist consulting and admitting services reach timely disposition decisions to free up stretchers. Do: prioritize re-evaluating “the movers” — those patients in whom disposition is readily attainable.	Don't: allow admitting services to dictate the terms of patient length of stay (e.g., “We'll admit the small bowel obstruction after the CT in the morning”).
Station 4: Charting and consults	
Do: above all, demonstrate a line of clinical reasoning. Do: consider brief bedside charting without compromising rapport. Do: ensure the impression and plan is legible and the most elaborate. Do: write succinct and frequent notes reflecting the dynamic nature of ED setting. Do: consult with a specific question or request.	Don't: rewrite data recorded elsewhere. Don't: delay an obvious consult. Balance this with optimizing the timing of consults that do require certain baseline data.
<small>CT = computed tomography; ED = emergency department.</small>	

overcrowding era, physicians need to be creative and actively engage in the use of space and master the peculiarities of their ED and hospital as a means of maximizing patient flow. As one faculty member with over 20 years' experience wrote, rather than being passive we must "captain the ship" and "control, control, control." Another point raised in numerous evaluations was having an available room for "quickie" patients who can be rapidly reassessed and discharged.

The participants revealed that documentation needs to communicate clinical decision-making ("a line of reasoning" as one faculty member wrote). Concurrently, charting must meet billing and medico-legal requirements. Bedside charting, avoiding redundancy and maximizing previous nursing and triage data are also useful strategies. In our experience as well, an on-site pharmacist to reorder regular medications can be useful for patients for whom prolonged ED stays are anticipated.

Areas for further development were suggested by participants and included discussing strategies for expediting laboratory work, transfers, consultations and admissions. As well, since patient throughput depends on interactions with multiple services and allied health professionals, future workshops should incorporate how to optimally interact with different clinical services, nursing managers and hospital administrators. Likewise, this workshop did not touch upon interactions with patients and family members, which are central to good EM and WFE.

Limitations

This study measured participant perceptions immediately following the workshop; however, an alternative methodology would have been a before-after evaluation. Moreover, the study did not evaluate clinicians' behaviours in practice or over time. Thus it is unclear if this intervention actually led to improved WFE or if behaviour decayed over time. However, this limitation can be extended to other stand-alone courses on topics such as cardiac resuscitation or trauma, which are also limited by a lack of data indicating long-term changes in clinical performance. In addition, some stations may need to be re-evaluated in light of the participant audience. For example, it is uncertain if charting methods by physicians in practice can be changed after years of ingrained habits. Future research directions would include interventional trials measuring the impact of such a workshop on indices of efficiency and throughput.

Conclusion

A workshop to formally teach WFE skills to EM residents

and ED physicians in practice was designed, implemented and evaluated with positive results. The time has come to make ED flow management a required competency before residency graduation. This competency should be explicitly taught and evaluated within training programs. We propose that a workshop format can complement the ED-based acquisition of this important skill set.

Acknowledgement: The authors gratefully acknowledge the support of the Emergency Multidisciplinary Research Unit (EMRU), Sir Mortimer B. Davis Jewish General Hospital and faculty EM physicians from the Royal Victoria Hospital, Montreal General Hospital and Jewish General Hospital without whose support this endeavour would not have been possible.

Competing interests: None declared.

References

1. Hockberger RS, Binder LS, Graber MA. 2007 Model of the clinical practice of emergency medicine. Chicago (IL): Accreditation Council for Graduate Medical Education; 2007. Available: www.acgme.org/acWebsite/RRC_110/110_clinModel.pdf (accessed 2008 Oct 1).
2. Royal College of Physicians and Surgeons of Canada. Objectives of training and specialty training requirements in emergency medicine. Ottawa (ON): The College; 2007. Available: <http://rcpsc.medical.org/information/index.php?specialty=122&submit=Select> (accessed 2008 Oct 1).
3. Apker J, Mallak LA, Gibson SC. Communicating in the "gray zone": perceptions about emergency physician-hospitalist handoffs and patient safety. *Acad Emerg Med* 2007;14:884-94.
4. DeBehnke DJ, O'Brien S, Leschke R, et al. Emergency medicine resident work productivity and efficiency in an academic emergency department. *Acad Emerg Med* 1999;6:90-2.
5. Dowd MD, Tarantino C, Barnett TM, et al. Resident efficiency in a pediatric emergency department. *Acad Emerg Med* 2005;12:1240-4.
6. Campbell SG, Sinclair DE. Strategies for managing a busy emergency department. *CJEM* 2004;6:271-6.
7. Denny CJ, Steinhart BD, Yu R. Improving physician flow and efficiency in the emergency department. *CJEM* 2003;5:271-4.
8. American College of Emergency Physicians. Efficiency in the emergency department. Dallas (TX): The College; 2004. Available: www.acep.org/practres.aspx?id=29876 (accessed 2008 Oct 1).
9. Singer JI, Dean J. Emergency physician intershift handovers. *Pediatr Emerg Care* 2006;22:751-4.
10. Khare R, Reinhardt G. Preparing ED residents to manage patient flow patterns using computer simulation models. *Acad Emerg Med* 2006;13:S208.

Correspondence to: Dr. Raghu Venugopal, McGill University Emergency Medicine Program, Royal Victoria Hospital, Rm. A4.62, 687 Pine Ave. W, Montréal QC H3A 1A1; rvenu@videotron.ca