In designing our study, we preemptively sought to reduce the impact of bias by selecting only those hospitalizations in which the principal discharge diagnosis was proximal or caval DVT. If thrombolysis were required for pulmonary embolism, myocardial infarction, or acute stroke, the necessity of CDT would very likely be the principal discharge diagnosis as opposed to DVT. In addition, we performed rigorous propensity-matched analysis using multiple covariates including shock and coagulopathy, which includes thrombocytopenia, and a comprehensive sensitivity analysis. The assumption that CDT is often used as a salvage therapy in patients for whom anticoagulation had failed may not always be the case. There are patients with proximal DVT who are not considered candidates for CDT because of their comorbidities. In fact, our unmatched data suggest that patients treated with anticoagulation alone had more comorbidities than the CDT patients.

The association of increased adverse events with CDT in our study is not surprising because CDT is an invasive vascular procedure using thrombolysis. We agree with Spies and colleagues that an estimate of true effect size is best assessed by a randomized trial, and we also agree that an end point like pulmonary embolism is subject to bias in this data set, as we have acknowledged in our article. However, end points like blood transfusion rates, inferior vena cava (IVC) filter placement, and length of stay are fairly reliable. Randomized trials have consistently shown increased bleeding rates and longer length of stay in CDT patients. In our CDT cohort, CDT was performed at a mean of 2.0 days and a median of 1.0 days, whereas IVC filters were placed at a median of 1.9 days and a median of 1.0 days, suggesting that the observed difference in IVC filter placements rates are truly related to CDT. In fact, IVC filter placement rates in the United States are significantly higher compared with other countries in both groups of DVT patients without evidence of clinical benefit.

We believe that our real-world data are the only available data that has specifically addressed the question of acute mortality in patients undergoing CDT. Our findings should be reassuring to physicians who are considering CDT as a treatment option and should help them with appropriate patient selection.

Riyaz Bashir, MD
Chad J. Zack, MD

Author Affiliations: Division of Cardiovascular Diseases, Temple University School of Medicine, Philadelphia, Pennsylvania.

Corresponding Author: Riyaz Bashir, MD, Division of Cardiovascular Diseases, Temple University School of Medicine, 3401 N Broad St (9 PP), Philadelphia, PA 19140 (riyaz.bashir@tuhs.temple.edu).

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Metrics for Evaluating the Quality of Handovers

To the Editor Devlin et al. found that morning handovers by on-call trainees were characterized by omissions of clinically important information. Given the paucity of handover research that use clinically oriented metrics, the authors’ efforts are commendable. Their findings, associating omissions to key hand-off characteristics, can provide a basis for further research on measuring care transition effectiveness. However, the mechanism of identification of clinically important issues and the claims that were made have several shortcomings.

First, as the authors acknowledge, the frequency of omissions is possibly an overestimation. We identify additional reasons for this inflation. Given that residents often have biweekly or monthly in-service rotations, it is possible that the receiving team was cognizant of patient status from their previous encounters. The small study sample of trainees (n = 19) and the lack of information on the distribution of omissions among trainees or across the 2 settings make it impossible to ascertain whether the omissions were skewed toward a set of morning handovers (eg, with gravely ill patients or an inexperienced trainee) or whether the omissions occurred during the initial data collection phase (when PGY-1 [postgraduate year 1] trainees were beginning their training). The reported k statistic of 0.49, generally considered to represent moderate agreement, further raises questions regarding the quality of identified clinical issues. It is also unclear whether the units had explicit sign-outs, which obviates the need for completeness during morning rounds presentation (eg, issues already managed and/or resolved). Presentations during morning rounds often involve the prioritization of pending tasks: on-call trainees are often asked to briefly summarize the major overnight issues, while patient details are often retrieved from the patient record on a need-to-basis. Finally, with only 1 researcher taking handwritten observation notes using a template, it is possible that issues that were discussed were not captured in the notes.

Second, contrary to the authors’ claims, research on handovers during morning rounds, while limited, do exist. Third, because the units used paper-based documentation and there was no standardized handover tool, omissions could more likely be a function of fragmented information in the environment, rather than distractions, interruptions, or lack of training. There is also evidence that dedicated environments lead to more efficient rounding and that pre-handover information organization using structured tools can result in effective care transitions. Nevertheless, the article by Devlin et al. represents a significant step in handover research and highlights the challenges of using clinical or patient outcomes to evaluate handovers.

Joanna Abraham, PhD
Thomas Kannampallil, BS
Khalid F. Almoosa, MD, MS
In Reply Abraham and colleagues raise important points regarding the challenge of developing metrics to evaluate the clinical consequences of incomplete handover communication, based on an impressive body of research focused on handover communication in the intensive care unit (ICU) setting.1-3 We developed our measurement approach with a specific goal to quantitatively measure how often on-call residents fail to handover on-call issues to the daytime physician team. This approach involved direct observation of morning handover communication to determine the proportion of clinically important issues (identified via real-time medical chart review) handed over by the on-call resident. Unfortunately, our approach did not allow us to determine whether these omissions actually resulted in patient harm or delays in care provision.

They assert that our estimation of the clinical importance of handover omissions may have been overstated by citing examples from their research of handover in the ICUs.2-3 The trouble is that the consequence of omitting an on-call issue at morning handover is very much dependent on context. The ICU is a highly centralized and monitored environment where information continuity (eg, ICU flow sheets, one-on-one nursing patient assignments) makes patient information and clinical status more readily available to members of the health care team. Also, structured interprofessional team rounds are the norm. As such, the omission of on-call issues at morning handover in the ICU may either occur less frequently, or even when they do occur, may not delay patient care as often because other redundancies in the system make up for lapses in physician-to-physician communication.

However, in the general internal medicine (GIM) ward setting, as typified by our study findings, the timing and format of morning handover, as well as the environment in which handover took place, was highly variable. Resident documentation of on-call issues was the exception, not the rule. Similarly, residents rarely updated the electronic sign-out tool to highlight new issues arising overnight. Other structural differences limit information sharing and continuity, which Abraham and colleagues acknowledge when they suggested that our findings might have resulted from the fragmented information systems seen in our GIM environment. However, this very fragmentation of patient information means that on-call issues omitted at morning handover are more likely to slip through the cracks, making consistent and complete morning handover of on-call issues even more critical.

While some of the methodological concerns raised may contribute to an overestimation of the prevalence and magnitude of the problem, we believe that the “true” proportion of omissions is still too high. For some of these issues, important delays in following up on on-call issues remain a real concern, especially in the GIM setting. Therefore, in addition to improving actual physician communication practices at morning handover, Abraham and colleagues remind us that we should also learn from other care settings such as the ICU and determine the extent to which changes to other parts of our system both before and after the handover event (eg, pre-handover information organization, dedicated team-based handover rounds, electronic documentation) can result in better continuity of care, and ultimately, better outcomes for our patients.

Natalie K. Kozij, MD
Megan K. Devlin, MD
Brian M. Wong, MD

Author Affiliations: Department of Medicine, Queen’s University, Kingston, Ontario, Canada (Kozij); Department of Medicine, University of Toronto, Toronto, Ontario, Canada (Devlin); Division of General Internal Medicine, Sunnybrook Health Sciences Centre, Centre for Quality Improvement and Patient Safety, Toronto, Ontario, Canada (Wong).

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