

Waterfalls and Handoffs: A Novel Physician Staffing Model to Decrease Handoffs in a Pediatric Emergency Department



To the Editor:

We read with interest the study by Yoshida et al,¹ aiming at decreasing the number of handoffs in a pediatric emergency department (ED). Although we acknowledge that the authors achieved their objective in reducing the proportion of patients who were handed over, we question the hypothesis underlying their study.

The authors suggested that the risk associated with handoff is well documented. In fact, 2 of the cited references for this assertion studied only communication errors associated with handoffs and not adverse outcomes, and the third described the results of a survey, which was subject to recall and hindsight bias. To our knowledge, no study to date has reported a higher risk of adverse outcomes associated with the practice of handoff. In contrast, several studies have suggested an opposite effect, in which handoffs present a possibility for a second opinion and may be associated with a decreased risk of medical error.

In a landmark study aimed at proving the risk of handoff, Kajdacsy-Balla Amaral et al² reported that nighttime cross coverage was in fact associated with better prognoses for ICU patients. Similarly, in a pilot study, we found that participation of more than one physician in patient care may reduce the rate of medical errors.³ We subsequently reported in an interventional randomized trial that the implementation of systematic cross-checking reduced the risk of medical error by 40%.⁴

We believe that the old paradigm that handoffs constitute a risk for patients should be reevaluated, and in this context, we question the results of the study by Yoshida et al.

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In reply:



We appreciate the comments from Dr. Freund in regard to our study. We read Dr. Freund's and Dr. Kajdacsy-Ballar Amaral's articles with great interest.^{1,2} Our field has more work to do to identify the root cause of errors in a busy emergency department (ED) environment. In our experience, we can identify many instances in which errors or omissions occurred during handoffs,^{3,4} and communication errors can negatively affect the care that we provide our patients.⁵ Reporting vital signs, laboratory results, and medical decisionmaking accurately is important and inaccuracies can lead to delays and rework for not only that patient but also for other patients in our care. In addition, we have found that our model has benefits that go beyond reducing the sheer number of handoffs. It allows us to optimize our productivity at the beginning of our shift, when we are fresh, rather than spending an extended period getting to know a large number of patients before starting to treat new ones. Also, having fewer handoffs gives us more time with patients and trainees and improves continuity with families.

Dr. Freund's study on reducing adverse events in the ED by having systematic physician cross-checking is interesting. Although we do not currently have a formal system of reviewing cases, we agree that having the option for a second opinion may be positive for patient care. A benefit of our new "waterfall" scheduling model's overlapping shift times is that we are often alongside another attending physician colleague in the ED, which

provides increased opportunity for consulting each other and sharing knowledge. This is good in principle for patient safety and is satisfying from a professional standpoint. We agree that more studies are needed to evaluate the impact of handoffs on patient outcomes so we can provide the best care for our patients while creating a safe and rewarding working environment for providers.

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Using High Sensitivity Troponin to Rule Out Myocardial Infarction



To the Editor:

Many thanks to Mirkin et al¹ for the Journal Club showing the problems with the study by Nowak et al² on the use of generation 5 high-sensitivity troponin T assay to rule out myocardial infarction. Because this was a derivation study, the results should be more transparent and give readers insight into the process of selecting a cutoff

point. The cutoff point derived would then be used in follow-up validation studies.

It appears that the initial selection of the cutoff point of less than 6 ng/L was derived from a previous study.³ However, the results of that study should have included (warning: nerdy concept coming up) the area under the curve (AUC) of the receiver operating characteristic (ROC) curve. It appears that this was not calculated, and their derived value should have been given in the introduction to this study.

The ROC curve gives the combined results of sensitivity and specificity for the possible cutoff points of the test being studied. The researchers can determine whether the test is reasonable by measuring the AUC, which gives an overall estimate of the value of the test. The AUC ranges from 0 to 1, with a value of 0.5 equivalent to the toss of a coin. In general, the higher the result, the better the test, and an excellent test would have an AUC greater than 0.9.⁴

This study apparently derived another test cutoff of less than 8 ng/L and a 30-minute Δ value of less than 3 ng/L. This requires that the authors create an ROC curve to find the optimal value for this “new” test. In reporting the results of this study, giving negative predictive values and sensitivity alone without also giving specificity and positive predictive values is dishonest and provides only half the picture. How many more patients will need admission to the hospital to be ruled out as a result of using this testing strategy?

A relatively minor issue is that the numbers do not add up. There were 569 patients in the evaluable cohort for the initial rule-in or rule-out part of the study. There were only 543 patients in the “ruled out” plus “ruled in” groups in Table 1. There were 539 in the “baseline/30-minute” algorithm. The “missing” patients should have been accounted for in the final results and in Figure 1.

It appears that the authors do have some connections to the manufacturer of the test, which should be acknowledged in the Journal Club and deserves further discussion. Because we know that industry influence in clinical studies is often associated with unrealistic results, it is important to further explore the potential for bias in the results.

Addressing these issues will improve our ability to use this test after appropriate validation studies.

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