

Mindfulness-Based Laboratory Reduction: Reducing Utilization Through Trainee-Led Daily 'Time Outs'

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ABSTRACT

BACKGROUND: Overuse of laboratory investigations is widely prevalent in hospitalized patients, leads to discomfort, and increases direct and indirect costs.

OBJECTIVE: We implemented a simple, inexpensive, mindfulness strategy on our inpatient medical clinical teaching unit to reduce unnecessary laboratory orders through education, a forcing function, and daily structured laboratory "time outs."

METHODS: On a 26-bed unit in an academic hospital center, the per-period laboratory costs per patient were compared pre- and postintervention using segmented regression analysis of an interrupted time series.

RESULTS: The average cost per admitted patient decreased from \$117 to \$66, with an estimated savings of \$50,657 over 985 admissions. After adjusting for fiscal period and the presence of our intervention, there was a significant reduction in the per-patient number of total tests, complete blood counts, and electrolyte panels performed ($P < .001$ for all level and time trend changes).

CONCLUSION: This trainee-designed and -led intervention, centered around structured, mindfulness-based laboratory test ordering, was successful at decreasing the overuse of common daily blood work in hospitalized patients.

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The systematic overuse of laboratory investigations in hospitalized patients has been decried for over 2 decades.¹ Drivers of overuse vary across and between

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institutions, physicians, and levels of training, and may include uncertainty of the diagnosis, lack of experience, adherence to hospital protocol or established routines, and lack of attention to, or knowledge of, associated costs.^{2,3}

Indiscriminate testing reduces the quality of patient care through increased patient discomfort,⁴ direct and indirect costs of care (test tubes, phlebotomy, and analysis time), creating a "needle in haystack" phenomenon where important results are buried amongst the unimportant, generating false-positive results with associated diagnostic cascades, and contributing to hospital-acquired anemia.⁵ Routine repeated testing, particularly for common tests such as the complete blood count, is seldom helpful in clinical management.⁶ For these reasons, several professional societies recommend the avoidance of routine laboratories in stable patients.⁷

This trainee-designed and -led initiative sought to translate such recommendations into action by implementing and

evaluating a simple strategy on our inpatient clinical teaching units designed to reduce unnecessary laboratory testing.

METHODS

Study Population

The intervention was conducted on our 26-bed medical clinical teaching unit at the Royal Victoria Hospital in Montreal, Quebec (517 total beds). This unit has an established culture of quality improvement, with twice-monthly dedicated academic rounds attended by the ward team.

Intervention and Implementation Data Sources

At baseline, doctors would write admission orders for daily blood tests, as was the prevailing culture. Orders were written on paper and transcribed into the computer by administrative personnel. The computer system did not have a forced end date; once ordered, daily laboratories would continue without any formal oversight, in perpetuity, unless specifically cancelled. Individual workarounds to avoid over-testing were put in place by some teams but were not systematic or formalized.

Spurred by the absence of a viable technological solution, 2 residents and one faculty member developed the concept of “mindfulness based laboratory reduction.” Regular physician education was combined with a forcing function, and a change in ordering culture was encouraged. Firstly, at monthly quality improvement rounds, a simple resident-led curriculum ([Appendix](#), available online) addressed the potential harms of over testing and outlined the intervention. Secondly, the ability to order daily laboratories beyond 2 days was removed, by implementing a unit policy universally applied at the level of transcription into the computer. Finally, daily afternoon sign-out was modified to include a “time out” briefly addressing any required laboratory testing for the following day. Junior residents and medical students would propose tests to the senior residents and faculty who would, in turn, discuss both value and necessity. Orders for the next day were recorded by the senior resident and submitted as a batch order for transcription into the computer. Emergency laboratory tests and those requiring advanced scheduling (ie, therapeutic drug monitoring) were not subject to these restrictions.

CLINICAL SIGNIFICANCE

- Overuse of routine laboratory tests in hospitalized patients is common, but seldom impacts clinical practice significantly.
- Daily blood work can lead to patient discomfort in addition to increased direct and indirect costs, investigative cascades, and inefficient care.
- In being medically mindful, combining education with regular “time outs,” the physician removes themselves from “autopilot,” and specific thought is applied to an area of overuse in need of focused attention.

Data Sources

A complete list of laboratory tests processed from our unit was available for 2 years prior to and 1 year after the intervention. Data were grouped by fiscal period and attending physician. Costs for each test were estimated based on provincial insurance reimbursement values (in Canadian dollars). Costs did not include the collection tubes or the labor required to collect and transport the blood. The number of admissions, deaths, length of stay, and intensive care transfers per fiscal period were obtained from admitting records.

Statistical Methods

The per-period laboratory costs per patient were compared pre- and postintervention using segmented regression analysis of an interrupted time-series as previously described.⁸ Estimated savings were calculated by comparing actual costs post-intervention with those predicted if we assumed no change from the

preintervention average.

To evaluate for potential safety signals, the proportion of admitted patients who died on the unit was compared pre- and postintervention using chi-squared. Before-and-after comparisons in the length of stay and monthly number of intensive care unit transfers used the Wilcoxon rank-sum test.

All comparisons were performed by using Stata version 13 (StataCorp LLP, College Station, Texas).

Role of the Funding Source

This project was completed without any internal or external funding.

Ethics

The McGill University Health Centre Research Ethics Board approved this study.

RESULTS

The total, per-period, and per-admission laboratory costs are shown in [Table 1](#). Crudely, the average cost per admitted patient decreased from \$117 to \$66, with an estimated savings based on 985 admissions of \$50,657. In the time series analysis, after adjusting for fiscal period and the presence of our intervention, there was a significant reduction in the overall number of per-patient tests, complete blood counts, and electrolyte panels ([Figures 1 and 2](#); $P < .001$ for all level and time trend changes).

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