



The need for better self-diagnoses by health systems

Preventing adverse events by mining “triggers” in patient data

How can hospitals improve patient safety when their own symptoms of malady are not reported?

According to the Institute for Healthcare Improvement (IHI), hospitals need more effective ways to identify events causing harm to patients, to quantify the degree and severity of harm, and to select and test changes to reduce harm. While there has been slow progress toward proactive prevention of adverse events, an innovative solution based on the IHI’s Global Trigger Tool offers great promise. This new Patient Safety Service identifies what has gone wrong and supports patient safety teams in improving clinical care processes. With the application of advanced analytics, it may even catch adverse events before they lead to patient harm.

A brave new world

The challenge of providing better quality at lower cost will be the focus of all health economies for the next 20 years—and data analytics will play a powerful role. More and more, health analytics are aimed at predicting what might happen, and even prescribing what will happen, and less on what happened, retrospectively. This presents real opportunity to drive benefits to all who pay for, deliver and receive healthcare.

This is the second in our viewpoint series on “Data and the Future of Healthcare.” Our previous paper reviewed options for improving cybersecurity and cyberprivacy postures in health organizations.

Tracking adverse events

Increased adoption of electronic health records (EHRs) creates a vast knowledge base on the course of patient treatment, including data on adverse events. Comprehensive insight into such events can lead to interventions that improve quality of care and patient safety.

But, unless health systems are adequately diagnosing their own symptoms, how will they improve?

Here are the reported facts:

- A *Journal of Patient Safety* study estimated the number of premature deaths associated with preventable harm to patients at more than 400,000 per year.¹
- Preventable medical errors persist as the No. 3 killer in America,² following heart disease and cancer, costing \$1 trillion each year.³

- The journal *Health Affairs* reported that 1 out of every 3 people encounter an adverse event when they are admitted to a hospital.⁴
- The National Center for Policy Analysis reported that costs associated with medical harm equal up to 45% of health care spending.⁵
- Hospital incident reporting systems do not capture most patient harm, and staff only report 14% of adverse events.⁶

Given that more than 85% of adverse encounters are not reported and medical error is claiming more 1,000 lives in the U.S. alone each day⁷, why are hospital incident reporting systems underutilized?

Where the system is failing and why

According to a report by Daniel R. Levinson, Inspector General for the U.S. Department of Health and Human Services, the top reasons hospital staff did not report harm events are⁸:

- No perceptible medical error
- Little harm or harm ameliorated quickly
- Event not on mandatory reporting list
- Event occurs frequently in hospitals
- Patient had history of similar events

A decade ago, 45% of surveyed physicians and 68% of surveyed surgical specialists indicated that they were either actively discouraged or passively discouraged from reporting adverse events and medical error by their institutions as it was believed that avoiding malpractice lawsuits and protecting an organization's reputation were more important than patient safety.

Given that voluntary adverse event and medical error reporting is not working, a different clinical protocol is needed to cure our health systems' deadly combination of adverse events and preventable medical error—the third largest killer in the U.S. as noted above.

Evidence indicates that patient safety programs are working at improving outcomes where implemented and endorsed.

It is practically impossible to cure a malady without first diagnosing it.

The global trigger tool

The Global Trigger Tool (GTT) for Measuring Adverse Events, created by IHI, holds great promise. It provides an easy-to-use method that identifies potential adverse events and preventable medical harm and measures their rate over time. The process has also proven to be very accurate, with predictable and repeatable results.

The GTT process helps patient safety programs:

- Identify adverse events and preventable medical harm
- Investigate the root cause or process errors that contribute to patient harm
- Improve process so as to prevent future patient harm
- Track rates of patient harm over time.

So, why hasn't the GTT spread as an antibody to adverse events and preventable medical error throughout all areas of practice in global health systems? Primarily because the methodology is based on manual, retrospective reviews of random samples of inpatient hospital records.

Although tracking adverse events over time is a useful way to tell whether changes are improving the safety of care processes, many clinicians do not have the extra time or desire to review files of patients already discharged. Many institutions lack the executive courage or funding capacity to dedicate substantial resources to a manual program. Additionally, a random sample methodology can be largely "hit or miss" given the small number of cases in some medical disciplines in some institutions.

So, where do we go from here?

Patient safety service: systematic detection using text mining

Forward-thinking health organizations have deployed innovative health analytics solutions that leverage the increased adoption of EHR systems.

Since screening large volumes of natural language, unstructured text is laborious, automated methods are highly desirable. In a pilot study of patients, a European hospital identified a subset of triggers in the GTT and used text mining to automate the discovery of adverse events. They achieved very high correlation between adverse events detected through automation, and compared with those detected manually. As a result, they were able to define the triggers most associated with avoidable adverse events.

This hospital worked with CGI to develop a continuous automated information system that analyzes all EHR clinical notes and produces a database of detected triggers. Based on the GTT, the system retrieves all text data for a specified medical specialty from the hospital's EHRs. The results are brought to clinicians in a secure, cloud-hosted dashboard, allowing

them to review those patient records that have presented the designated triggers. Documents containing the triggers statistically associated with avoidable adverse events are analyzed to determine patterns in the treatment and the root causes leading to those events.

Results of the implementation include:

- All medical records in this discipline are now analyzed
- There is no need to dedicate time to isolate cases for review—the process is automatic
- Results are more effective and complete, creating the possibility for immediate action to be directed to process or system problems
- The efforts of skilled professionals are focused on improving processes to effect better patient safety and outcomes, as opposed to manually reviewing records.

Patient Safety Service

Based on the IHI Global Trigger Tool

1. **Identify**
2. **Investigate**
3. **Improve Process**
4. **Track Outcomes**



CGI's Patient Safety Service is an innovative solution based on the GTT that enables big data mining tools to automatically detect potential adverse events. The solution provides a comprehensive electronic dashboard of confirmed adverse events affecting patients in the course of treatment. Improved patient safety can be promoted and the impacts of interventions can be followed up over time.

By identifying adverse events that have lead to patient harm, health systems are able to pursue the IHI Triple Aim framework of improving the patient experience of care, improving the health of populations, and reducing the per capita cost of healthcare.

The Patient Safety Service dashboard is designed to deliver and support outputs and outcomes such as:

- Reduced adverse events
- Reduced costs with respect to secondary complications
- Reduced costs with respect to quality and risk management

STAGE 2

- Automated information collation for aggregate use
- Automated tooling integrating policy changes in support of patient safety
- Integration to best practice protocol, clinical guidelines and cost conformance tools
- Automated identification of adverse events in real time

STAGE 1

- Automatic identification of potential adverse events
- Supportive analysis for remediating areas of concern
- Reduced resources for manual adverse event and preventable medical error reporting

STAGE 3

- Automated prescriptive analytics dedicated to preventing adverse events and medical error before they occur
- Increased sustainability of healthcare

Patient Safety Service provides a comprehensive dashboard of confirmed adverse events affecting patients in the course of treatment.

Patient id	Treatment period	Start of treatment period	End of treatment period	Patient age	Trigger 1	Trigger 2	Trigger 3	Trigger 4
000703	1	18.03.2014	18.03.2014	41	6	16	0	0
000704	2	18.03.2014	18.03.2014	30	0	8	0	0
000705	3	18.03.2014	18.03.2014	26	14	7	2	0
000706	4	18.03.2014	18.03.2014	60	13	0	6	5
000707	5	18.03.2014	18.03.2014	18	4	5	5	0



Next steps

CGI's Patient Safety Service provides the foundation for future proactive prevention of adverse events. Advanced analytics capabilities can be applied to patient safety program data, offering great promise for identifying and catching adverse events before they lead to patient harm. To learn more about this solution please visit www.cgi.com/en/solutions/patient-safety-service, or to schedule a discussion with a CGI health analytics expert, please contact info@cgi.com

¹ [“A new, evidence-based estimate of patient harms associated with hospital care.”](#) James, John T. Phd, Journal of Public Safety, Sept. 2013

² [“Death by medical mistakes hit records.”](#) HealthITNews, July 18, 2014

³ [“The economics of health care quality and medical errors.”](#) Journal of Health Care Finance, Fall 2012, 39(1):39-50, Andel C1, Davidow SL, Hollander M, Moreno DA;

⁴ [“Global trigger tool” shows that adverse events in hospitals may be ten times greater than previously measured.](#) Health Affairs, 30: 581–589, Classen DC, Resar R, Griffin F, et al.

⁵ [NCPA Report in Health Affairs April 2011](#)

⁶ [“Hospital Incident Reporting Systems Do Not Capture Most Patient Harm”](#) (OEI-06-09-0091), Jan. 2012, Daniel R. Levinson, Inspector General, U.S. Department of Health and Human Services,

⁷ Ibid.

⁸ Ibid.

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