Novel Daily Management and Focused Employee Training Leads to Improved Patient Safety by Reducing Delays in Critical Result Reporting to Henry Ford Hospital and Medical Centers Providers

Henry Ford Health System
HENRY FORD HOSPITAL

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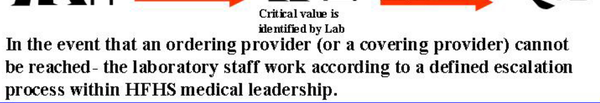
Abstract

Background: Our academic healthcare system comprises of five tertiary care hospitals and 29 medical centers. The majority of clinical laboratory testing services are provided through our core/stat laboratory located at the flagship hospital. This laboratory reports over 25 million test results annually, during a routine day over 130 of these test results are categorized as a 'critical value' (CV) i.e. they are significantly outside the reference range and reflect an immediate life-threatening situation. For a CV, the ordering provider must be notified immediately so that clinical intervention can be initiated. In the event of a failure to reach the ordering provider, alternative escalation pathways should be followed. Once a notification has been completed, it should be duly documented in the electronic medical record (EMR). This is a requirement of regulatory agencies and a National Patient Safety Goal. Our laboratory strives for a defect-free process and performance. Our aim was to study and monitor our notification/escalation process, identify defects and use this information towards improving process with corrective and preventive measures.
Methods: This quality improvement and patient safety project has been ongoing since December 2012 and is overseen by a team of medical technologists and pathologists. Our team defined a defect as any deviation from the procedure covering detection, notification and documentation of a critical value and our target is Zero Defects. To achieve this, we designed and implemented a system of visual daily management that is focused on tracking, trending, closure and follow-up of defects. On a daily basis, the data from preceding day were collected from laboratory information systems and systematically reviewed by the team. If a defect was detected over this period, the entire preceding day was marked red on the visual board and if none were detected, it was marked green. Each defect was subsequently studied for root cause(s) and the team initiated an appropriate countermeasure. These countermeasures included several process redesigns and training modules that were aimed at reducing variation, standardizing work and reducing time spent in re-work. The efficacy of these countermeasures was gauged by continued daily monitoring and pre- and post- training assessment. The assessment included five scenario based questions that evaluated the CV notification and escalation process.
Results: Our initial CV defect rate was 25 defects (from 3750 CV events)/month (3.99 sigma performance). With implementation of our system of visual management, this was decreased to 9 defects/month (4.57 sigma) at month 6, then sporadically rose to 11 defects/month at months 11, 15, 20 and has now stabilized at 3 defects/month (4.66 sigma) at month 20. The underlying fluctuations and root causes for these defects were successfully ascertained and found to be variation in work and lack of daily monitoring (month 0-6), implementation of a new electronic medical record (months 11-15), reduction in staff (month 15) and inconsistent comprehension of the procedure by technical staff (month 20). The targeted interventions included implementation of the visual daily management, employee interviews and standardization of processes (month 0-6), followed by standardization of EMR orders (months 11-15), re-hiring of staff (month 15-19) and simplification and re-training of entire technical staff (months 20-21). The amount of time spent in re-work reduced from 18.75 hours/month (at month 0) to 2.25 hours/month (at month 21). For training modules, the assessment scores improved from 75% (pre-training) to 97% (post-training).
Conclusion: We have demonstrated the design and implementation of an effective system of daily management that has drastically improved our laboratory's process efficiency and patient safety. This was achieved without additional staff or resources. This approach to daily management has allowed our employees to collectively work together when guided by a standardized visual approach and to understand root cause(s) and design effective countermeasures. We have successfully cascaded this approach towards monitoring and improving other process metrics as a best practice across our health system and recommend its adoption by other medical laboratories.

Background

The Core/Stat Laboratory is located at Henry Ford Hospital Detroit Campus (K6) and we report over 6 million test results every year. Of these results, an average of 150/day are of critical nature, (i.e. they are significantly outside the reference range and reflect an immediate life-threatening situation). Ergo, the ordering provider must be immediately notified so that prompt clinical intervention can be initiated for our patients. Further, critical value (CV) results must be released and documented according to the requirements of National Patient Safety Goals.



In the event that an ordering provider (or a covering provider) cannot be reached- the laboratory staff work according to a defined escalation process within HFHS medical leadership.

AIM

- Communicate, document and escalate (if needed) all CV results in a timely and consistent manner
- Any deviation from this defined and standardized process is considered a defect (i.e. 0 defect threshold)
- Do effective PDCA of each instance of CV defect

Current Condition

Number of CV/month	>3500
Number of CV defects/month	25 (0.7%)
Sigma level	3.99 σ
Time to resolve defects	18 h 45 m

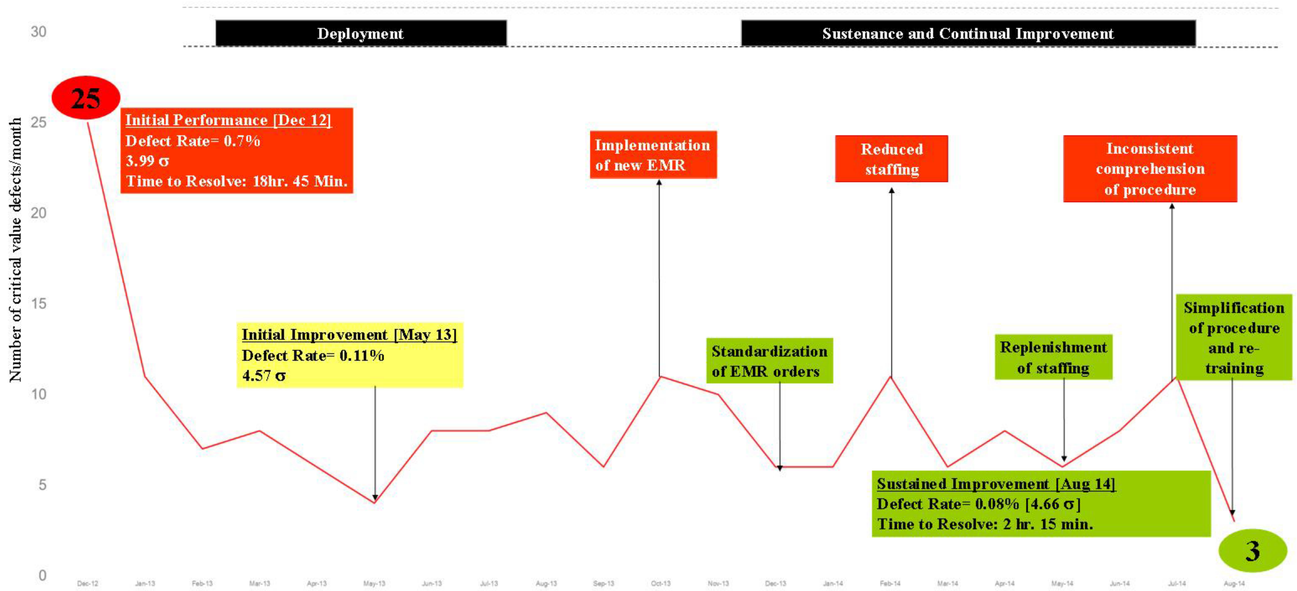
Root-Causes

Root Cause	Significance	Resolution
Providers are not reachable by phone	CV notification is delayed and care may be compromised	Investigate defects and work with providers for contact details
Lack of standard work for CV escalation process	Inconsistent escalation process	Develop a flow-chart depicting standard escalation process
Inconsistent comprehension of procedure	Usually new hires, led to failure to notify	Group training and individual competency assessment

Our Strategy

We designed, implemented and improved on a system of visual daily management that focused on tracking and trending defects related to critical values, while also focusing on employee education

Methods, Measures & Improved Performance



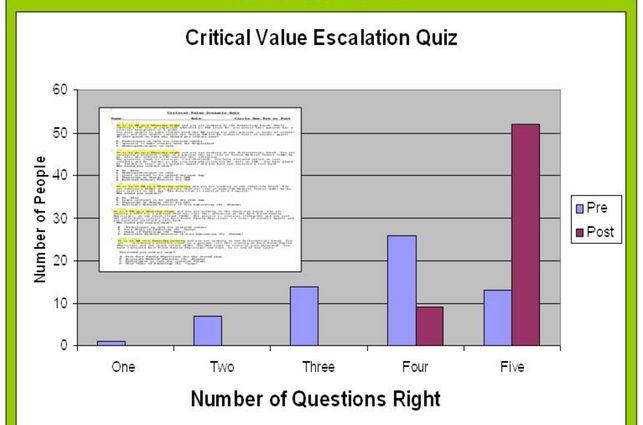
Reduction in Critical Value Defects. This graph represents the improvement in the performance of our laboratory's safety (S) metric related to notification and documentation of a critical value notification to an ordering provider. It represents the initial gains in performance during deployment (December 2012-May 2013), subsequent monitoring of performance (April 2013-August 2014) impacted by varied root-causes (↑) and improvements through countermeasures (↓).

Corrective Actions and Interventions

- Daily monitoring on Daily Management board
- Process redesigns
- Education a lab meetings and one on one
- Developed standard work; flow chart and table
- Education in small focus groups
- Update to procedures

Aim: reduce process variation, rework and time & create standard work

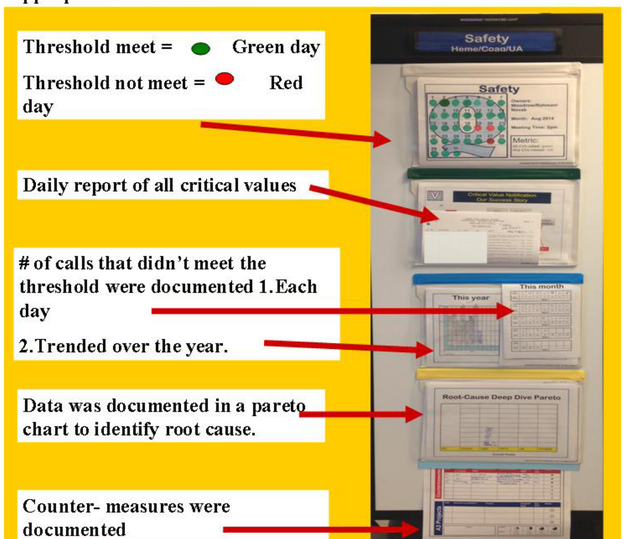
EVIDENCE OF EFFICACY (Complex Scenarios)



Assessment scores improved from 75% (pre-training) to 97% (post-training).

Evaluation of Change

Daily Management, a visual tool for monitoring a process daily to adjust and manage your work in real time. Each defect was subsequently studied for root cause(s) and the team initiated an appropriate countermeasure.



Outcome: Success!

Results

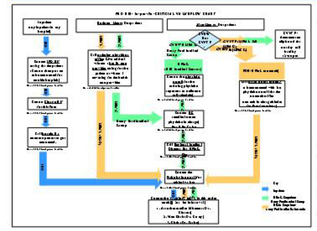
Number of CV/month	>3500
Number of CV defects/month	3 (0.08%)
Sigma level	4.66σ
Time to resolve defects	2h 15m

Sustain and Spread

This is now a system-wide initiative and best practice model for patient safety within medical laboratory service line.

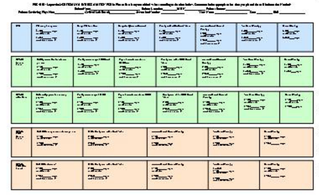
Ongoing data collection	Daily management board is still in use Data is collected daily Threshold remains: Zero critical value reporting and documentation
Spreading change	Daily Management boards are used throughout the PALM systems to identify root cause and drive PDCA.
Policy/Process changes	Standard work (flow chart and escalation table) Procedure was updated and clarification was added.
Actual to goal	Goal is reaching zero, August 2014 has 3 critical value reporting and documentation defects a 4.66 sigma improvement from December 2012.

Tools for Improvement



Visual Aids [Flowchart]

18 pages of a complex procedure were converted into a simplified and color-coded flowchart for easy understanding, consistent Interpretation and notification.



[Form]

A standardized and color-coded escalation form (corresponding to the flowchart, above) was created for ease of understanding and documentation by our laboratory staff.

Conclusion

We have demonstrated the design and implementation of an effective system of daily management that has drastically improved our laboratory's process efficiency and patient safety. This was achieved without additional staff or resources. This approach to daily management has allowed our employees to collectively work together when guided by a standardized visual approach and to understand root cause(s) and design effective countermeasures. We have successfully cascaded this approach towards monitoring and improving other process metrics as a best practice across our health system and recommend its adoption by other medical laboratories.

References

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Vinuthree Swamy MD, Gaurav Sharma MD et. all A Formalized Daily Review Reduces the Critical Value Callback Defects. American Journal of Clinical Pathology. AJCP 2013; 140:A196-A205