Intermountain Healthcare

Leaping to A's: Using Leapfrog Safety Grade Certifications to Improve Medication Safety

EMRAM STAGE 7

Case Study

Intermountain Healthcare

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Profile

Intermountain Healthcare is an internationally recognized, integrated, not-for-profit health system based in Salt Lake City, Utah, (USA) with 33 Hospitals, (includes „virtual" hospital), 385 Ambulatory Care Centers (clinics), approximately 3,900 employed physicians and advanced practice providers, and a health insurance company, Select Health, which covers more than 1.2 million lives. Intermountain is widely recognized as one of the premier healthcare systems in the United States and as a leader in transforming healthcare through high-quality clinical outcomes and efficient healthcare delivery at a sustainable cost.

Intermountain is the largest healthcare provider in the Intermountain West with more than 60,000 caregivers (employees) serve communities in seven US primary states: *Utah, Idaho, Nevada, Colorado, Wyoming, Montana,* and *Kansas,* and also regularly treat patients from other parts of the Intermountain West. In addition to the services and care it offers in its physical facilities, Intermountain Healthcare also provides extensive telehealth services with over 35 telehealth programs in the western United States, further enhancing Intermountain Healthcare's ability to provide quality-based medical care to patients across its vast geography. Intermountain has been delivering on its mission of helping people live the healthiest lives possible.

Intermountain Healthcare is the ***first healthcare system in the world*** to earn **"Triple Stage 7 Organization" status** by adding HIMSS' new EMRAM22 **Aspirational Maturity Model Standard** requirements to their O-EMRAM and AMAM Stage 7 achievements, for care facilities located in Utah & Idaho.

Intermountain's quest for better health and high-quality care at more affordable costs is the driving force behind Intermountain's commitment to truly transform healthcare across the country. Intermountain Healthcare is uniquely positioned in the nation to provide technological advancements and innovative solutions that help meet the demand for high quality care at a sustainable cost with a long history of excellence in healthcare technology & innovation, development and to find solutions that help patients and those who provide care and to improve care and outcomes for patients.

Date Stage 7 was achieved: March 1, 2022.

The Challenge

In 2016, Intermountain Healthcare hospitals earned a lack-luster two As, four Bs and four Cs in Leapfrog's hospital safety ratings. Our CEO Dr. Harrison joked recently that those grades were *"not something you'd necessarily want to put on your refrigerator as a report card"*. Since that early start our healthcare system has transformed its strategic safety mission, strengthened leader and governing board accountability for patient and caregiver safety and adopted a centralized Leapfrog survey submission process to accelerate progress along the path of high reliability and keeping people safe.

Leapfrog is a nonprofit watchdog organization that prioritizes a culture of safety and the adoption by hospitals of evidence-based safety practices. As part of the evaluation Leapfrog requires hospitals to conduct a scenario-based test of their CPOE. Our initial experiences with the CPOE test in 2018 revealed significant opportunities to improve how the EHR flagged medication orders and prompted responses from the ordering provider. Our challenge became how to improve medication safety for our patients without increasing alert fatigue and provider burnout. Improvement in letter grades became a distant third-place consideration.

Implementation Overview

Implementation began by gathering an information services group, composed of IT clinicians, physicians, pharmacists, and registration specialists to complete the centralized CPOE evaluation for every eligible Intermountain hospital. Each question that Leapfrog rated "failed" at one or more hospitals was categorized and the mitigation options were analyzed using a Lean Six Sigma PICK chart. Improvements were prioritized and then scheduled over the following year. Using this process repeatedly over successive improvement cycles has allowed Intermountain Healthcare to greatly improve our scenario-based scores while continuing other ongoing maintenance and enhancement work on the CPOE.

Our information services group was intentional in the use of some guiding principles for our improvement work. First, our goal when addressing opportunities was always to balance patient safety and provider alert fatigue and to balance the best use of our resources while minimizing negative consequences for patients and decision support users. These principles were foremost during the Leapfrog project improvement cycles. Whenever possible, and when supported by the data, we prioritized decreasing alert fatigue due to the following: drug-drug alerts, therapeutic duplication alerts, and drug-lab result alerts. The rationale for reducing drug-drug alerts was a recognition that these alerts typically led to low rates of order modifications by providers suggesting our CPOE was creating more noise than valuable clinical information. For therapeutic duplication we recognized that standardized order templates and a team-based approach to order review were more effective in reducing medication order errors than alerts except in the case of specific high-risk scenarios such as anticoagulant orders. For drug-laboratory contraindications we opted to replace alerts with dynamic displays of lab values.

QUOTE FROM ORGANIZATION EXECUTIVE:

"It is an honor for Intermountain Healthcare to be recognized among the top healthcare systems. These high ratings show Intermountain's dedication to the clinical quality, safety, and experience of our patients and our caregivers. The results reflect Intermountain's hard work, leadership, and systemwide collaboration and our efforts by our clinicians, providers, CTIS caregivers, and other cross functional teams".

–Farukh Usmani, MD, MSHSM, Medical Director, Digital Technology Services, Intermountain Healthcare

In contrast, to enhance patient safety and meaningful use our team prioritized alerts for these criteria: drug-diagnoses and drug-dose during our Leapfrog project. The rationale for this focus was that drug-diagnosis alerts tended to have the highest clinical impact in our assessment and alerting was consequently increased for specific drug-diagnosis interactions. Similarly, in drug-dose alerts we routinely evaluated alerting and filtered out inappropriate routes for medication administration. Use Intermountain Continuous Improvement (CI) Model applied to review drug database for high impact opportunities.

Steps for a Successful CPOE Clinical Decision Support (CDS):

Identify Gap ➤ Identify Solutions ➤ Apply 5 rights of CDS ➤ Alerts Committee Review ➤ Deploy

Our Leapfrog improvement was supported by Intermountain Healthcare's standard continuous improvement infrastructure for Clinical Decision support which is composed of five stages. First, gaps are identified through various sources including front line caregiver suggestions, informatics analysis of near misses or sentinel events with a medication component, issues identified internally by our CPOE team and in the current project, issues identified through an external review process, the Leapfrog CPOE scenario-based test. Next, possible solutions are identified and evaluated for success based on existing EHR configurations. We then apply the five rights of decision support to inform our design: right Information, to the right person, in the right intervention format, through the right channel, at the right time in the workflow. Proposed designs are reviewed by the Alerts Committee, where the design is reviewed by an interdisciplinary panel for final approval, with special consideration to alert fatigue in the context of existing competing factors. Lastly, we build and deploy the CDS tool, being sure to create education for the front-line caregivers who will be seeing it and undertake before- and after- deployment data analysis to ensure the CDS tool is working as designed.

The Lean Six Sigma PICK Chart:

During our Leapfrog evaluation and solutions implementation, we discovered the value of sorting and prioritizing opportunities to address CPOE gaps by using a version of a Lean Six Sigma PICK chart. It helped us pursue a consistent, disciplined process to identify which problems were most in need of address, how much work was required to resolve them and sort them into categories. This practice was particularly important since the CTIS team did not have additional FTE resources to shoulder unanticipated work. High impact and low effort changes however could often be integrated judiciously into existing workload, low effort-low impact changes could be addressed during lulls in other scheduled builds leaving only high impact- high effort projects

High Impact/ Low Effort IMPLEMENT	High Impact/ High Effort CHALLENGE
Low Impact/ Low Effort POSSIBLE	Low Impact/ High Effort KICK OUT

CPOE Decision

to be prioritized and scheduled. Notably some work could be removed from consideration for the current cycle if both difficult to implement and not likely to yield significant impact on safety. The following three examples illustrate how the PICK list facilitated key improvements.
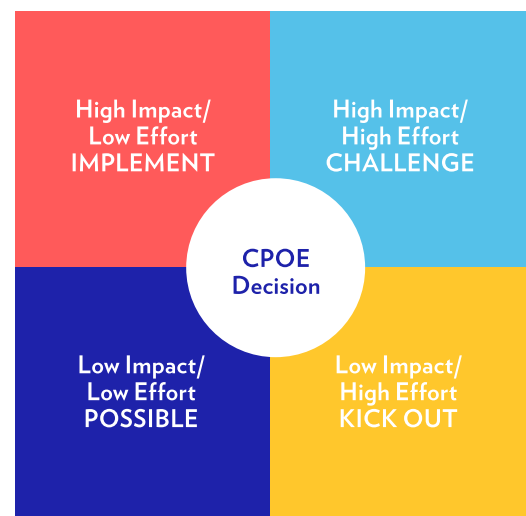
Intervention #1
- **Order:** Flumazenil 0.2 mg intramuscular (IM) once
- **Opportunity:** Contraindicated route
- **Intervention:** Filtered IM routes from options; added comment "IV into large vein only"
- **PICK Chart:** Possible
- **Impact:** Low

To pass this question on the Leapfrog scenario test, the ordering provider should not have been able to order flumazenil by the intramuscular route. By default, in our iCentra (Clinical Application) EHR all medications that are injectable can be given via IV, IM, SQ, etc. This was part of our default initial EHR configuration. To prevent this, we would have had to specifically target and alter flumazenil. We completed some data analysis and, although this error had never been documented in the system history, our CTIS team went ahead and filtered IM routes from flumazenil and added the comment "IV into large vein only".

Intervention #2
- **Order:** Fluconazole 200 mg oral daily
- **Opportunity:** Existing order for tacrolimus
- **Intervention:** Elevated the interaction for these drugs from default so it would alert providers
- **PICK Chart:** Implement
- **Impact:** Moderate

To pass this question the provider should have received a warning about the possible drug interactions between fluconazole and tacrolimus. In the drug database for our EHR this interaction is considered major but not "major contraindicated". We had previously decided through the Alerts Committee, to only display major contraindicated drug interactions. We posed the question of increasing the level of the drug interaction to our Medication Safety Committee and they approved increasing the interaction level to Major Contraindicated.

Outcome of Intervention #2:
Data from 6/8/2021 to 7/8/2021

Fluconazole vs. Tacrolimus alerts	
Total alerts seen	297
Alert seen, both orders continued as is	267
Alert seen, either medication order modified	18
Alert seen, either medication order removed	12
Either medication order modified within 10 minutes after alert fired	16

After deployment of the solution, we reviewed the outcomes to ensure we were not increasing provider alert burden and at the same time having no effect on ordering practices. From this table you can see that about 15% of the time a change was made to the order after the provider saw the alert.

Intervention #3
- **Order:** Misoprostol 600 mcg oral once
- **Opportunity:** Documented pregnancy with abortifacient
- **Intervention:** Custom alert
- **PICK Chart:** Challenge
- **Impact:** High

This example corresponds to an actual near miss on a patient in a busy obstetrical practice. The Leapfrog CPOE test presented an order of misoprostol 600 mg oral once on a patient with a documented active pregnancy. The default in iCentra (Our HER Clinical Application) at the time was to generate alerts on many medications that are frequently used purposefully in pregnancy such as for Tucks pads at the same severity level as alerting for teratogenic medications such as warfarin. We had found this decision support performance unacceptable and had turned off the alerting but not yet replaced it with new CDS tools. As a result of the test and recognition of the high inherent risk, we created a custom alert

for this situation. Working with the OB/GYNs, oncologists and rheumatologists we created a custom list of medications that should alert for patients with a documented active pregnancy. Due to the catastrophic impact of not alerting when indicated our team decided to err on the side of over alerting.

Outcome of Intervention #3:
Data from 8/6/2021 to 8/13/2021

Total Alerts 608
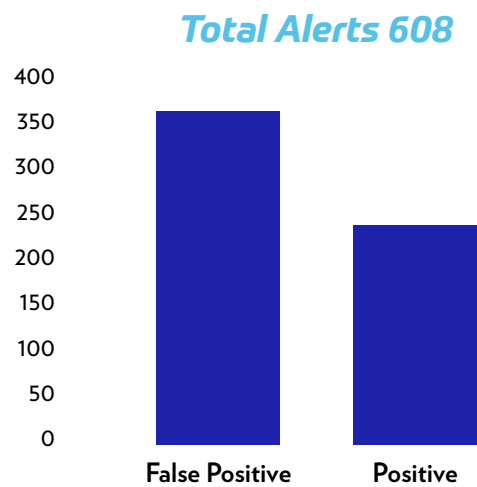
After we implemented the custom alert, we did some data analysis to evaluate the alert burden. About 60% of the time the alert was a false positive and 40% of the time was a true positive. The OB/GYNs felt this was appropriate and we continued the alert to ensure no patient harm. We will be continuing to modify and improve this alert over time to decrease the number of false positives.

Key Participants Involved in the Process:
- Physician Champion + Healthcare Informatics & Technology Leader: Dr. Farukh Usmani, MD, MSHSM, Medical Director, Digital Technology Services, Intermountain Healthcare
- Operational Champions: Elizabeth McKnight, MA MS CPPS, System Director – External Reporting

- Sathya Vijayakumar MS, MBA, Clinical Operations Manager
- Pharmacist: Harmony Schneider, PharmD, BCPS, Clinical Informatics Analyst

Resulting Value / ROI
No matter how informative, Clinical Decision alerts can overwhelm the provider. The interruptions can decrease physician productivity and increase the risk of burn out. Despite advances in electronic medication order entry systems, it has been well established that clinicians override many medication alerts generated by the EHR. We have decreased alert fatigue by suppressing low risk drug-drug interactions & therapeutic duplications; we also decreased alert fatigue by passively displaying related lab values rather than actively interrupting the providers.

Clinical Decision Support Alert Responses:
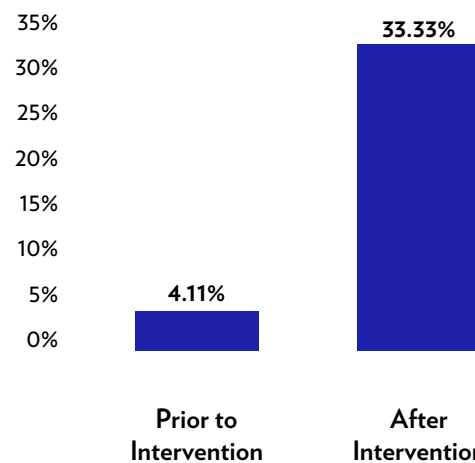
The above graph shows provider actions in response to alerts before and after implementation. Prior to suppressing the lower risk drug-drug interaction alerts, 96% of the time no action was taken by the provider and only 4% of the time was an action taken. Our conclusion was that prior to the intervention the vast majority of the time the CPOE was not providing relevant alerting. After
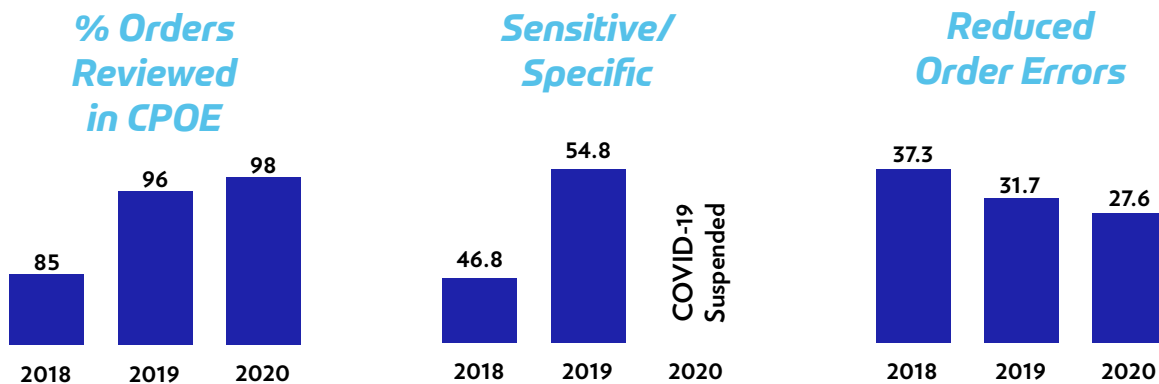
the intervention, providers made changes to the order a third of the time, a significant improvement in risk reduction. The impact of the alert was improved, and our providers felt their efficiency was increased.

In addition to improved response to alerts, review of data external to the CPOE demonstrates the impact of the improvement cycles prior to a pandemic-related suspension of the Leapfrog CPOE test requirements. Intermountain hospitals have eliminated some CPOE workarounds which circumvented real-time review by the ordering provider with decision support, attaining 98% effective coverage of medication orders in 2020. At the same time, CPOE scenario-tests showed a marked increase in compliance of CPOE alerts with ideal performance on the Leapfrog benchmark. Finally, our internal tracking system

for safety events demonstrated a concomitant reduction in medication order errors during the same period. Intermountain's CTIS team is looking forward to submitting to the Leapfrog CPOE tests again in the summer of 2022 to gauge impact of interventions deployed since 2020.

Finally, while ultimately not the real objective of the continuing CPOE improvement work, Intermountain's twelve eligible hospitals have achieved an all-time high of ten As, one B and one C grade, that last grade a pointed reminder that the improvement journey is never complete and that newly-opened hospitals will be measured by the same high standards of patient safety as those with an established reputation for high-value care and patient and caregiver safety. Our communities deserve nothing less than highly reliable and excellent care.

Impact on Patient Safety: Reduced Order Errors and Improved Patient Safety

% Orders Reviewed in CPOE

2018	2019	2020
85	96	98

Sensitive/ Specific

2018	2019	2020
46.8	54.8	COVID-19 Suspended

Reduced Order Errors

2018	2019	2020
37.3	31.7	27.6

Lessons Learned

- Identify gaps in medication safety and draw upon external benchmarks when available

- Use a team approach and Lean Six Sigma for solution development and deployment

- Health systems can strike a balance in CPOE alerts that reduce risk of medication order errors without exacerbating provider alert fatigue

- Effective collaboration between physicians, nurses, advanced practice providers, pharmacists, informaticists, data analysts and administrative leaders is critical for sustainable improvement in patient safety and Leapfrog safety grades

- PICK chart methodology useful for prioritization

ONE SENTENCE THAT ENCAPSULATES THE EXPERIENCE AS A WHOLE:

"

Large integrated healthcare systems can utilize a multidisciplinary team and make incremental, data driven, continuous improvement changes to lead the way in EHR configuration to promote sustainable and supportive provider work environments while increasing patient safety.

Intermountain Healthcare
Healing for life®
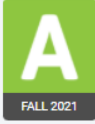
Questions?
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Intermountain Healthcare
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Recently published safety letter grades for twelve Intermountain Hospitals:

Intermountain Alta View Hospital
This Hospital's Grade: **A** FALL 2021
9660 South 1300 East
Sandy, UT 84094-3793
View the full Score

Intermountain Medical Center
This Hospital's Grade: **A** FALL 2021
5121 South Cottonwood Street
Murray, UT 84157
View the full Score

Intermountain American Fork Hospital
This Hospital's Grade: **A** FALL 2021
170 North 1100 East
American Fork, UT 84003-2096
View the full Score

Intermountain Park City Hospital
This Hospital's Grade: **A** FALL 2021
900 Round Valley Drive
Park City, UT 84060-7552
View the full Score

Intermountain Cedar City Hospital
This Hospital's Grade: **A** FALL 2021
1303 North Main Street
Cedar City, UT 84720-3462
View the full Score

Intermountain St George Regional Hospital
This Hospital's Grade: **A** FALL 2021
1380 East Medical Center Drive
Saint George, UT 84790
View the full Score

Intermountain LDS Hospital
This Hospital's Grade: **A** FALL 2021
Eighth Avenue and 'C' Street
Salt Lake City, UT 84143
View the full Score

Intermountain Utah Valley Hospital
This Hospital's Grade: **A** FALL 2021
1034 North 500 West
Provo, UT 84604-3337
View the full Score

Intermountain Logan Regional Hospital
This Hospital's Grade: **A** FALL 2021
500 E 1400 N
Logan, UT 84341-2499
View the full Score

Intermountain Riverton Hospital
This Hospital's Grade: **B** FALL 2021
3741 West 12600 South
Riverton, UT 84065-7215
View the full Score

Intermountain McKay-Dee Hospital
This Hospital's Grade: **A** FALL 2021
4401 Harrison Boulevard
Ogden, UT 84403
View the full Score

Intermountain Layton Hospital
This Hospital's Grade: **C** FALL 2021
201 West Layton Parkway
Layton, UT 84041
View the full Score

Leapfrog Group issues safety letter grades only for hospitals with sufficient public data to permit statistically valid evaluation. Critical access hospitals and specialty hospitals are not included in the letter grade program.

Produced by

HIMSS