Reducing Medication Errors by Revamping mCDS Alerting: The Goldilocks Principle

Northern Light Health

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Executive Summary

Alert fatigue is a common problem in clinical practice; a result of clinicians receiving multiple well-intentioned but irrelevant medication alerts that distracts the provider from the task at hand and disrupts the clinical workflow. The sheer number of workflow interruptions cause clinicians to become desensitized to alerting intended to improve patient safety and thus reflexively dismiss alerts. "*In essence, a proliferation of alerts that are intended to improve safety actually results in a paradoxical increase in the chance patients will be harmed*"[1] Consequences of reflexive alerting dismissal compromise patient safety and produce suboptimal clinical decision-making. In the case of medication alert fatigue, the impact can be an increase in medication errors.[3]

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Medication alert management via clinical decision support (mCDS) has been a focus for Northern Light Health for many years. Historically, our insight into mCDS was limited, only available by time-intensive data review of multiple disparate sources. While acute care data was queried from our system-wide EHR inpatient deployment, ambulatory data was supplied by a complex review of multiple different ambulatory platforms. Due to our numerous ambulatory Electronic Health Records (EHRs), we were forced to adopt different Clinical Decision Alerting approaches, not based on best alerting practice, but on the relative advantages and limitations of each ambulatory platform that reflected the investment of that specific platform's stakeholders. In essence, Northern Light was working in an environment of multiple different data silos.

In 2018, Northern Light Health transitioned ambulatory clinics to the primary inpatient vendor platform, providing a single, system-wide approach to clinical workflows, and unifying capacity for data analysis, informatics governance, and informatics clinical support. The capability to review mCDS data at a system-wide level provided insight into overall medication Clinical Decision Support processes. We began a new initiative to enhance patient safety by reducing the degree of alert fatigue, with the expectation that removal of nuisance alerting would positively impact not just the provider EHR experience, but also reduce the overall incidence of medication errors systemwide. This initiative was powered by robust and consolidated information from our unified system, for the first time allowing us to leverage Northern Light Health system-wide data on medication alert volume, alert overrides, and medication error rates. We partnered with Leapfrog and Cerner to query our system and determine where our alerts were deficient and understand where we could focus our improvement efforts on high-risk clinical scenarios. We brought together hundreds of stakeholders, led by Clinical informatics, and included representation from pharmacy, pharmacy information systems, inpatient practitioners, ambulatory practitioners, specialty practitioners, nursing, and other clinical disciplines. Leadership by Clinical Informatics allowed the work to be deeply entrenched in Clinical informatics principles, building on pivotal clinical decision support concepts such as "the five rights of effective alerting" and the "10 rules of Clinical Decision Support," which were reviewed as a group at the start of each meeting.

The unified and systemwide approach succeeded in dramatically reducing the level of nuisance alerting, with a 45% reduction in spurious duplicate drug order alerting (DUP), a 64% reduction in low-yield dose range checking (DRC), and a 72% reduction in clinically irrelevant drug-drug interaction (DDI). Guided by Leapfrog best practice, we developed multiple new alerts for medications that were previously unmonitored. Both the implementation of the new alerts,

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and the reduction in provider cognitive burden led to an improvement in medication errors systemwide at Northern Light Health. Overall medication nuisance alerts decreased by 63%, medication errors decreased by 38%, Leapfrog Computerized Provider Order Entry (CPOE) safety scores improved by 8%, and provider satisfaction improved regarding mCDS workflows.

Lessons learned

- A multidisciplinary and standardized approach is needed to optimize medication alerting.

- Achieve quick wins by focusing on high impact alerts; excessive alert totals with high override rates.

- Change in "override" culture is not immediate and make take six months or a year to see an effect.

- Success requires prospective analysis of new functionality and continuous retrospective review.

- Bar Code scanning alone did not decrease medication errors. CPOE and medication reconciliation processes are also required.

Next Steps

- Additional Leapfrog CPOE alert optimization.

- Continued optimization and focused maintenance of mCDS alerting via formal governance.

- Develop a review process for non-mCDS alerts to decrease spurious alerting and enhance the decision support provided.

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Define the Clinical Problem and Pre-Implementation Performance

A rigorous focus on patient safety is deeply entrenched in the culture of care delivery at Northern Light Health. Despite operating out of multiple ambulatory and inpatient EHRs, staff was well educated on the process of self-reporting medication errors, and our transparent culture supported timely reporting of errors. Care teams were consistent in their use of CPOE with rates >95% across all EHRs. Despite our culture and focus, the sheer number of different medical systems, coupled with the different capabilities of each EHR, made reinforcing a systemwide standard of medication alerting difficult. Each EHR operated as a silo, with only a modest unifying governance connecting different records to defined system standards. The shift to a single EHR platform brought forward the opportunity to unify our alerting philosophy system-wide via this project. After the transition to a single EHR, our providers were experiencing a far higher alert override rate than what was found in systems of similar size.

Physician Alert Fatigue Prior to Implementation of Changes
- 131,000 mCDS alerts over three-month time span
- 83% override rate for all mCDS prior to implementation of changes
    - 86.7% Drug-Allergy
    - 89.4% Drug-Drug
    - 78% Drug- Duplicate (after initial spike; multiple categories were added during and immediately after ambulatory implementations)
    - 84.8% DRC
- 1 in 4 medication orders generated an alert!
- Override rate led to reflexive provider dismissal
    - 40% of overrides deemed inappropriate
- Consequences:
    - Compromised patient safety
    - Lost productivity/efficiency
    - Desensitization

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  o Suboptimal clinical decisions

These numbers deeply illustrated the reflexive dismissal culture that had taken hold among providers. Multiple studies have supported that alert fatigue can lead to medication errors as the result of prescribers becoming desensitized to the multiple alerts.[3,4]

In 2019, our system average Leapfrog CPOE test score for medication safety and alerts was 60% with five of our eight sites reporting a "failing" score. In order to improve vast updates to medication alerting were required, targeting a variety of Leapfrog assessment categories, including drug-disease, drug-age, and drug-lab.

We were faced with a dichotomy; how could we justify adding hundreds of Leapfrog-recommended alerts to a system where reflexive dismissal of alerting had taken hold? We needed a holistic approach to reduce current alert fatigue, move to the Leapfrog recommendations for mCDS, and implement change. Only accurate and effective medication alerting would turn the tide of the reflexive dismissal culture to harness the efficacy of appropriate medication alerting and improve patient safety.

Reduction in medication errors was the key clinical focus for this initiative. We achieved an overall reduction of **38%** in those errors, with a numerator of medication errors reported per 100 orders, and a denominator of patient days. There were no exclusions in the reported medication error data. The data was obtained by elective active reporting.

In addition to reducing medication errors through improved alerting, we worked to improve Leapfrog medication safety testing scores across Northern Light Health. Our work yielded a systemwide improvement of 8% in base Leapfrog scores. The work was done alongside ongoing EHR development, aligning our bar code medication administration (BCMA) and CPOE rates with the industry standard of >95% as measured in the achievement of HIMSS levels 6 and 7 for EMRAM and O-EMRAM, respectively. Our next patient safety achievement had to be successfully mitigating our alert fatigue issue because this is a significant unintended consequence of the computerization of health care and a significant patient safety hazard.[2]

While health equity was not a direct focus of our alert optimization project, health equity is built into our medication reconciliation process for medication safety. Patient compliance comment fields, notifications for care management, and price transparency are tools in place to identify possible

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concerns. Also, within the mCDS builds, algorithms look for age, co-morbidities, pregnancy, etc.

Design and Implementation Model Practices and Governance

Evolution and Oversight

EHR governance structure at Northern Light Health is driven by the Clinical Stakeholder Group (CSG) which provides expertise from the clinical domain to guide the effectiveness and delivery of IS services and solutions across Northern Light Health (Figure 1). The governance committee assures the tools and technology implemented align with the strategic initiatives of our organization. They review and recommend optimization requests to EHR functionality and define and prioritize EHR demands which ultimately reduce variability and increase consistency by leveraging leading practices and standardized terminology, workflows, configuration, and reporting.
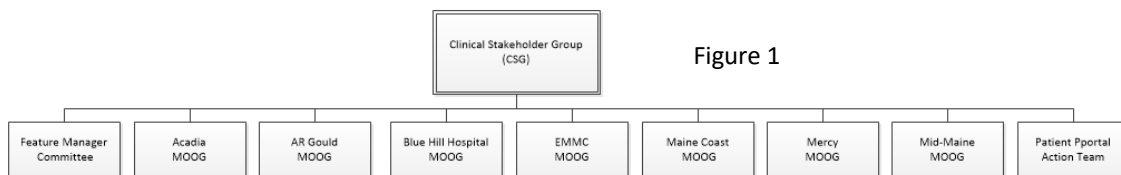

Figure 1

The Clinical Stakeholders Group uses the following committees, councils and groups to vet requests:
1) Nursing Informatics Stakeholder Council
2) Nutrition Affinity Group
3) Pharmacy Council (Software and Technology Council)
4) Therapies Director Group
5) Primary Care Service Line

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As the relationship between information systems (IS), Clinical Informatics (CI), clinical leadership, and business/operational leaders strengthened, the need to achieve a clinically led, IS supported, patient focused, data driven structure, governance emerged. Northern Light Health moved from a siloed approach with limited communication and collaboration, to an integrated process supported by shared strategic goals and a desire to improve quality outcomes.

This clinically led, IS supported structure is founded in a top-down/bottom-up approach (Figure 2). The leaders responsible for the top-down tasks focus on establishing the strategic vision, identifying the core EHR and business vendor functionality, and selecting new or niche clinical and business vendors. The bottom-up methodology uses a multi-disciplinary clinical (front-line) team and concentrate their efforts on EHR and digital optimization and core business enhancements that promote workflow efficiencies.

Clinical staff play an important role in the Northern Light Health EHR/technology committee structure. Bedside nurses and practicing physicians participate as clinical champions and stakeholders on teams that support EHR optimization and projects. Their experience and input ensure all teams follow a clinically led process. Their active engagement has proven to be key to adoption and mastery of all EHR and technology solutions.

While Northern Light Health is comprised of 10 hospitals with many resources and governance layers, this structure is applicable to organizations of any size. The critical components are 1) a clinical leader with informatics knowledge, 2) IS collaboration, 3) front line staff (e.g., providers, nurses, ancillary/support staff) interested is serving as EHR champions and 4) an organized structure for reviewing, approving, and prioritizing requests. Building a governance structure with these basic elements ensure the establishment of a successful EHR/technology governance process.
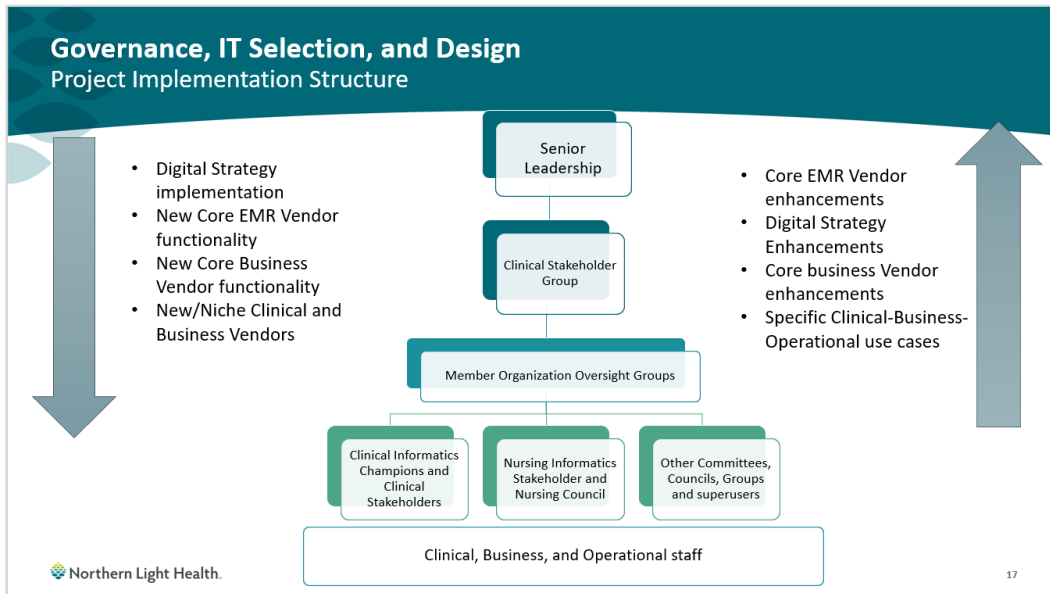
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Figure 2

The Birth of a New Governance

The implementation of a unified EHR platform brought the opportunity for expansion of our governance structure. Our focus on mCDS with collaboration between acute and ambulatory teams led to the development of a new CDS committee (Figure 3). This group oversaw much of this project work.
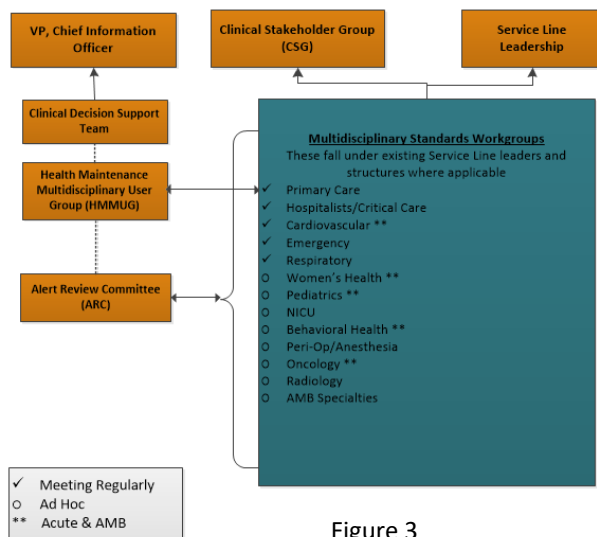

Figure 3

Escalation Pathways

- For evidence-related items: Service Line Leadership
- For non-evidence-related items: Clinical Stakeholder Group

Focus Areas

- Order Sets
- Care Pathways
- Health Maintenance Reminders
- Clinical Alerts
- Advisors (Sepsis, VTE, Foley)

Project Kickoff and Guiding Principles

As our alerting reduction and medication error improvement project kicked off, our first step was to understand how alert fatigue had taken hold within the Northern

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Light Health system, and what affect the desensitization was having on medication error rates. The previous lack of systemization and standardization within the different silos of each EHR had prevented us from large scale, system-wide improvement. As those silos came together to operate within a single EHR, three overlying groups emerged:

1. Providers proposed new alerts, based upon isolated events (sentinel and patient harm) with minimal appreciation of the underlying global alerting burden.
2. Pharmacy stakeholders identified and guided conservative alerting options, based on an approach in support of care delivery but rarely aligned with provider workflows.
3. Pharmacy IS governance implemented alerts during the development of new EHR build, while struggling to maintain and update our Multum database due to competing priorities.

Northern Light Health needed a unifying governance structure to bring these disparate alerting initiatives together. As we came together under a single source of data, we realized a multi-disciplinary approach was required to accomplish our goal. Our focus team took shape, and included:

- Clinical Informatics Leadership
- Providers
- Pharmacists
- Pharmacy IS
- Information Systems
- Clinical Informatics
- Project management
- EHR practitioner consultants

Our mission and process required a large-scale project, supported by a united governance structure. We partnered with our vendor, leveraging new tools and experience to attain alerting improvements. The new plan required us to better understand our current medication error issues and to maximize use of our technology.

The Goldilocks Principle

Finding the right balance was our team mantra, one that we affectionately channeled via *The Goldilocks principle: Striving for "Just Right"*[4] Our goal was to simultaneously revamp our medication clinical decision support to reduce the heavy alerting burden, while increasing areas of high-value alerting associated with essential Leapfrog-vetted enhancements. To accomplish this goal, we relied

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on informatics principles, focusing on seminal articles such as, *The Ten Commandments for Effective Clinical Decision Support: Making the Practice of Evidence-based Medicine a Reality*[5] and basing much of our work on "The 5 Rights of Clinical Decision Support."[6]

- the right **information**,
- to the right **person**,
- in the right intervention **format**,
- through the right **channel**,
- at the right time in **workflow**.

Key steps included:

1. Gain an understanding of current Northern Light Health drug alerting.
   - Evaluate appropriateness of duplicate drug alerting for providers
   - Evaluate appropriateness of drug-drug subtype alerting based on position (major contraindicated/major/moderate/minor). Evaluate appropriateness of who is alerted (pharmacists and providers).
   - Reduce the incidence of spurious alerting from localized discern alerts through a review and adjustment of current discern rules.
2. Identify and understand Northern Light Health's highest use medications and evaluate opportunities for reduction on drug-specific level following Cerner's novel identification approach.
3. Implement SmartZone functionality to reduce interruptiveness of some alerting.

Finding the Balance

As we set out on our path to understand our alerting needs, we came to realize there were areas that needed to be **Reduced**, **Optimized**, and **Added** (Figure 4).

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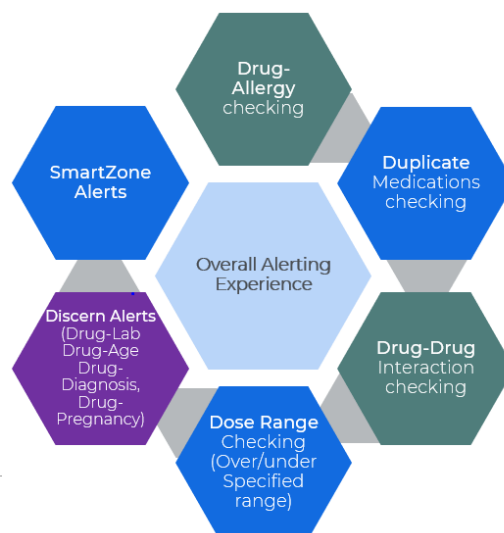
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Figure 4

Optimization of mCDS is not something that happens with the flip of a switch, and the impact of change can take months to realize. Many of the alert changes were done in the background. Slowly but steadily, providers began to experience less redundant and spurious drug alerts. This thoughtful approach proved invaluable. Our focus on alert reduction, leading to a decrease in alert fatigue with its resultant drop in medication errors rolled onward, largely under the radar of our providers, who on reflection noticed that many bothersome alerts had simply fallen away. Over time, we began to hear more workflow satisfaction from our clinical staff associated with the process of medication ordering. We followed up with some active, provider-forward education, around aspects of alerting improvements and data entry regarding how allergies were documented and described.

Clinical Transformation enabled through Information and Technology

The workflow design for the optimization of mCDS took shape about three years prior to the realization of its value (Figure 5). This opportunity was complex with minimal room for a point of failure. Through deep, multi-specialty collaboration, utilizing multiple Plan/Do/Study/Act cycles, we developed and implemented our alerting reduction strategy across the majority of our alerting framework. We looked at reduction in spurious alerts arising from duplicate

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alerting (DUP), drug-drug interactions (DDI), dose-range checking (DRC), and drug-allergy.
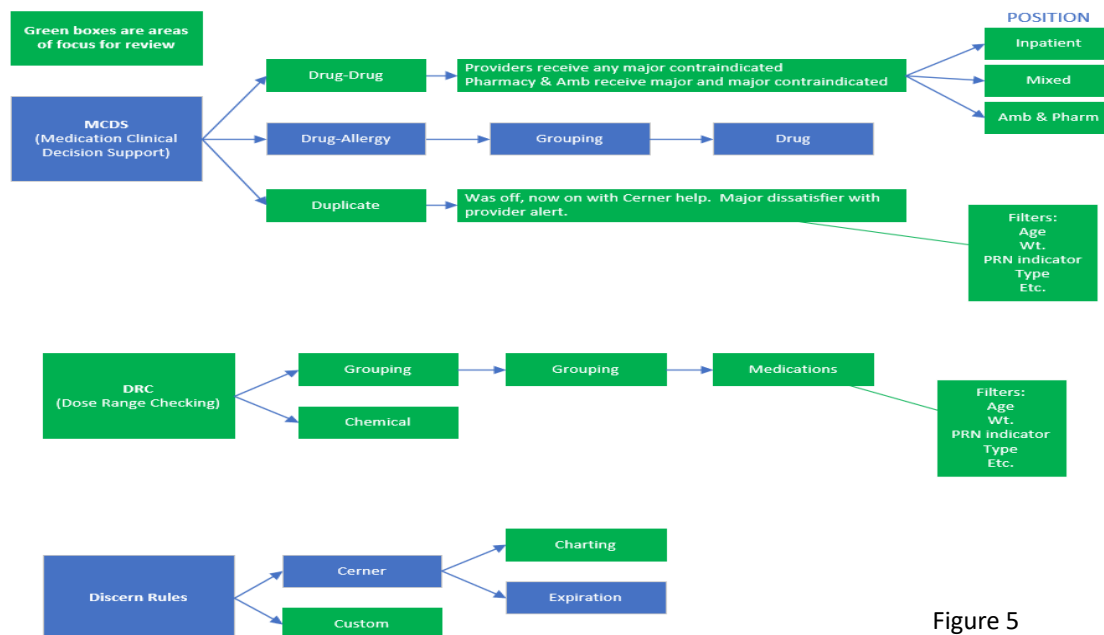

Figure 5

We started with DUP alerting. Prior state included a barrage of alerting, which had a negative impact on the provider workflow. We had to decide which alerts were worth interrupting that workflow and which alerts to omit.

Our process for reducing DUP included vetting filtered and reduced therapeutic classes.
- Reduced multiple therapeutic classes from triggering drug-duplicate alerts
- Exception frequency filtering – filtering of one-time orders for specific therapeutic classes (steroids, loading doses, etc)
- Scheduled/PRN filters – filtering out duplicate therapy alerts between scheduled and PRN medications

To manage the DDI alerts we leaned toward major contraindicated drug-drug interactions. In a conservative approach, we evaluated the top 50 major DDIs not overridden by ambulatory care providers and added them to the major contraindicated list.

Dose range checking alert optimization work was broken out into three phases:

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- In phase one, we made large alert-reduction slices in a variety of categories. We removed error alerts of "insufficient data to provide clinical guidance." Alerting the provider that the system did not have enough information to provide an alert was not beneficial! Our increase in telehealth during COVID-19 had a huge impact on the ability to have an available weight on the patient. To mitigate this alert, we increased the acceptable duration of vital signs/weight lookback alerting associated for ambulatory locations (except oncology) to support visits where in-office weights were not available. Underdose alerting was another nuisance alert suppressed deemed unnecessary for the vast majority of medications other than those ordered in oncology.

- In phase two of dose range checking, we used tools and support from our EHR vendor, who facilitated knowledge transfer share from client to client. By focusing on top groupers of high-volume alert meds (25 medications) and eliminating alerts that were providing no clinical benefit, we were able to realize significant focused improvement in alerting volume. Mitigation of the alerts associated with those 25 medications impacted 50% of the DRC over alerting! The majority of the DRC alerts were built on conservative package inserts from Multum drug content. We were able to customize these drug alerts and monitor them based on real-time data.

- The final phase continued our focus on high dose range checking groupers. We ran simulations monitored with real-time dashboards via a non-production domain based on previous ordering activity and analyzed the impact of various modifications. Using this technique, we identified where those would fire and the impact on the workflow prior to putting those alerts into production. As in prior phases, this approach focused on the balance of beneficial vs. spurious alerting, which allowed us to balance patient safety against potential alert fatigue (Figure 6).
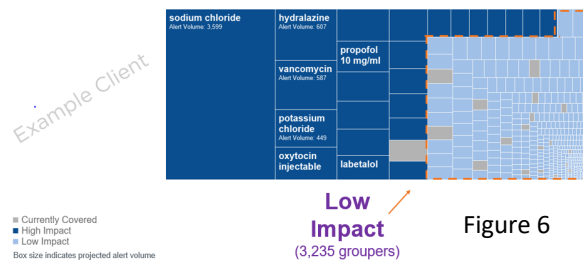

Figure 6

Upon the completion of our dose range checking work, we considered enhancements and improvements to our alerting portfolio. This effort was

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accomplished via the implementation of net new rules for Leapfrog, implemented as focused discern alerts.

- Drug – Age: Adjusted dose ranges for specific medications for age 65 and greater
    - Ex: diazepam > 65 do not exceed more than 10 mg/day (watch for hypotension and excessive sedation)
- Drug - Diagnosis: Added Cerner medication-disease alerting for specific combinations of medications and problems/diagnoses (excluded ONCE and PRN orders)
    - Ex: non-cardio-selective beta-blockers – asthma/COPD
- Drug – Lab: Added custom alerts upon order entry when corresponding lab value above or below specific threshold
    - Ex: warfarin with INR greater than 4
- Drug – Pregnancy: Added Cerner pregnancy rule based on medication risk and pregnancy-related problems/diagnoses. (Excluded ONCE orders and extensively localized standard rule)
    - Ex: thalidomide, statins

As per the 5 Rules of Clinical Decision Support, the time and format of an alert is as important as the information provided. Prior alerting was limited to chart opening or upon order placement (Add-to-Scratchpad). These modalities were highly interruptible to the provider workflow. In order to move some alerts to a less intrusive area of the workflow, we enhanced the utilization of the SmartZone functionality within the EHR. SmartZone is a passive alerting window available in all areas of the patient's chart. This option displays information, warnings, and non-critical alerts. These passive alerts display when entering and refreshing the view in a patient's chart, acting as reminders on items that need attention, while providing a less disruptive experience (figure 7).
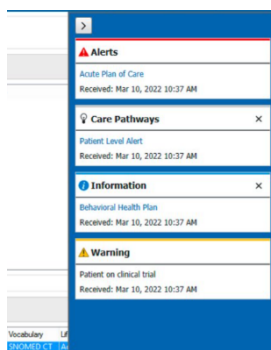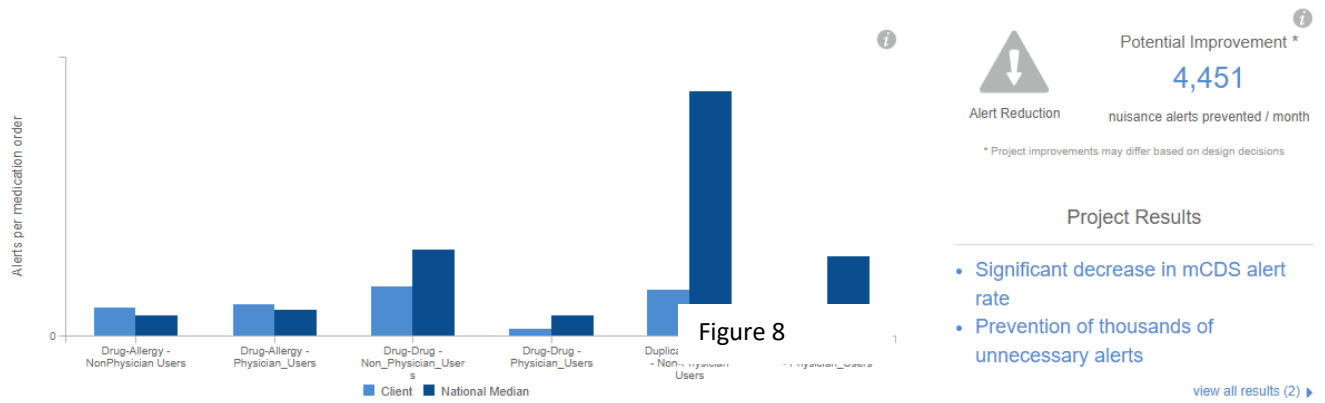

Figure 7

Monitoring and Review

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A data-driven, governance-led improvement process is key to a successful mCDS journey. We closely monitored our work throughout the project, watching carefully to ensure that reduction in alerting did not lead to potential increase in error. In addition to pre-production simulation and post-production monitoring, we carefully monitored incidents of drug error, watching for a potential increase in adverse impact. As we continue to monitor and benchmark against our peers, we observe that Northern Light Health is a leader within mCDS management, a dramatic difference from where we started (Figure 8).

Figure 8

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Improving Adherence to the Standard of Care

Optimizing alerts at Northern Light Health has been a long and fruitful journey. We were able to make significant improvements once we eliminated silos of data and governance. Northern Light Health has access to multiple data sources including the EHR provider's advance dashboards driven by the Lights On Network. The improved process measures in alert optimization have yielded a decrease in spurious alerts:

- 45% reduction in duplicate drug orders (DUP)
- 64% reduction in dose range checking (DRC)
- 72% reduction in drug-drug interaction (DDI)

The total alert reduction for mCDS and alert volume per 100 order actions by physicians/extenders over time is represented below: (Figure 9).

- The numerator is the total mCDS alerts
- The denominator is the medication order

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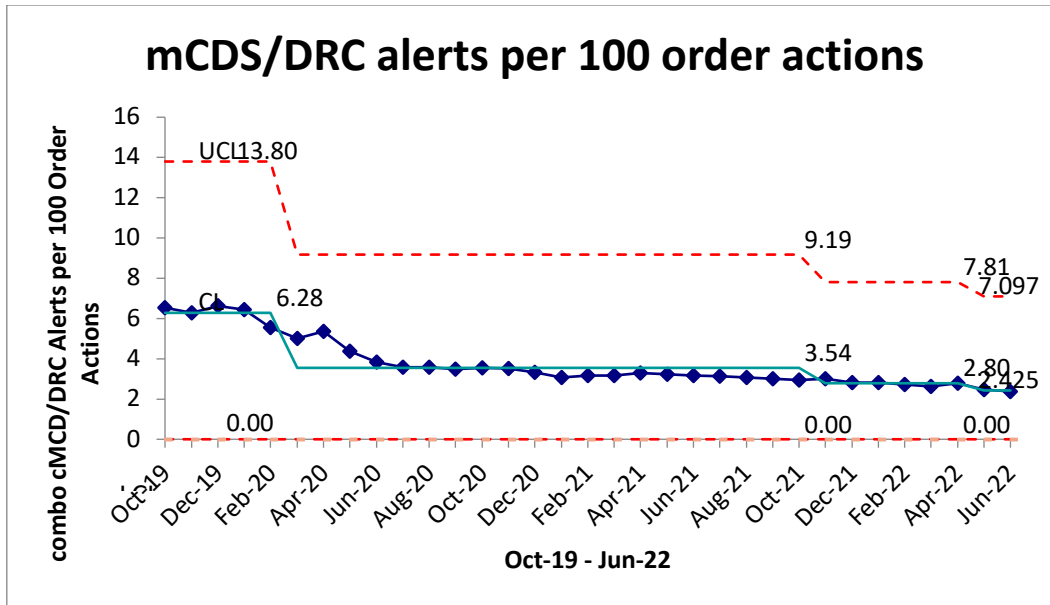
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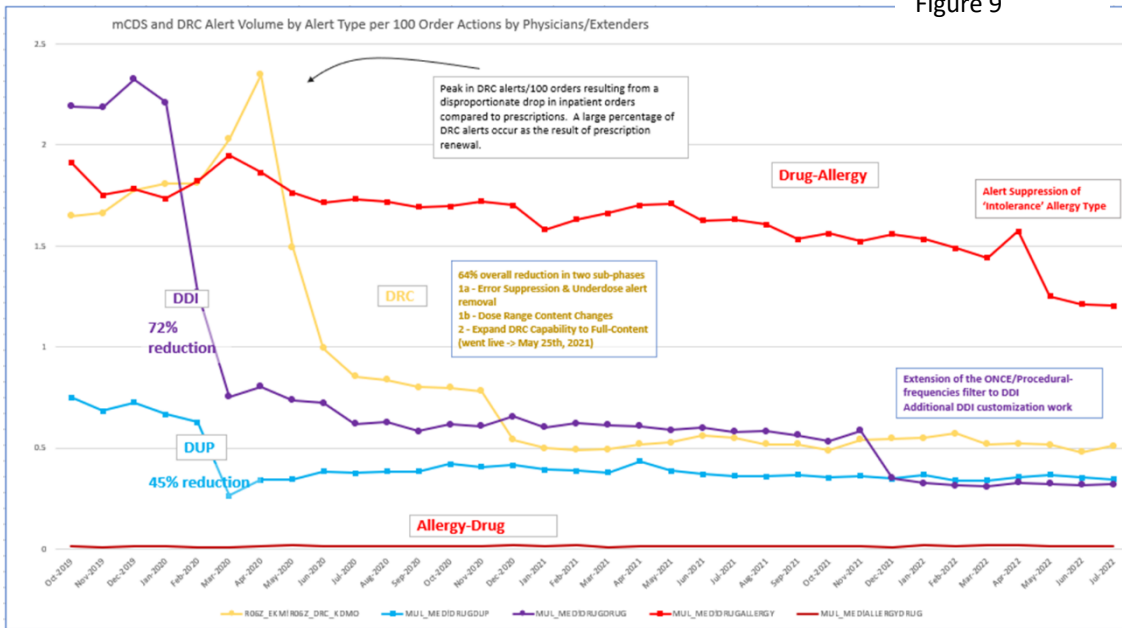
Figure 9

Figure 10

A reduction by category over time is represented above (Figure 10).

In addition to decreasing the total alert volume, override rates dropped. This happened at a slower rate than initially expected as it took some time to see changes in the reflexive override culture (Figures 11 and 12).

4% overall decrease in override rate
- 3% decrease for Drug-Allergy
- 9% decrease for Drug-Drug
- 6.7% decrease for Drug-Duplicate
- 11.5% decrease for DRC

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% Override Rates & Alert Volume by Type | Trend Graph
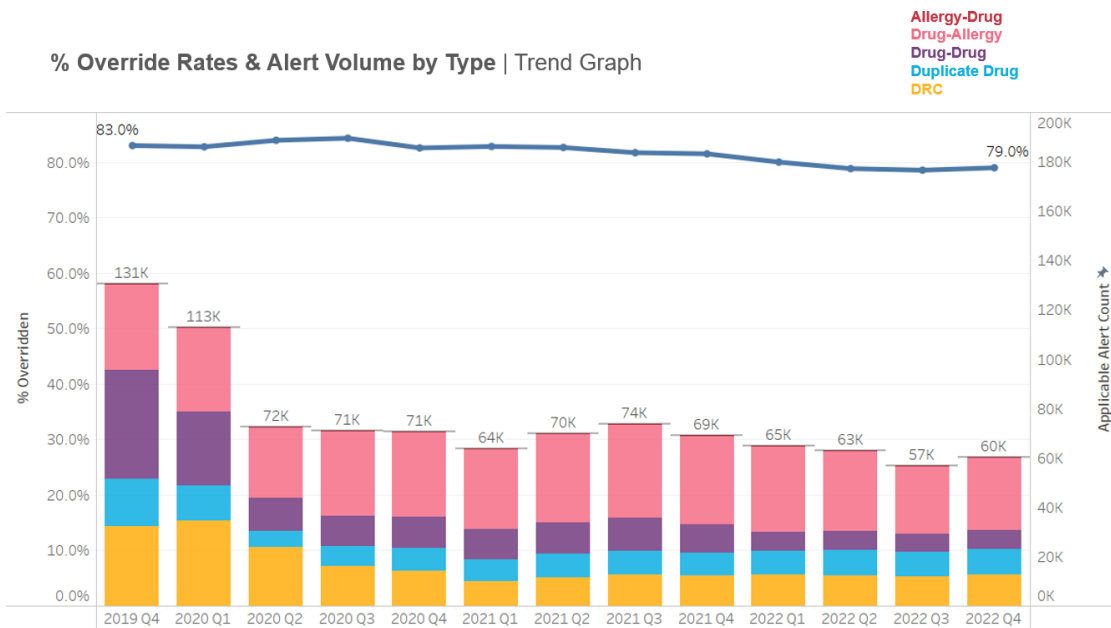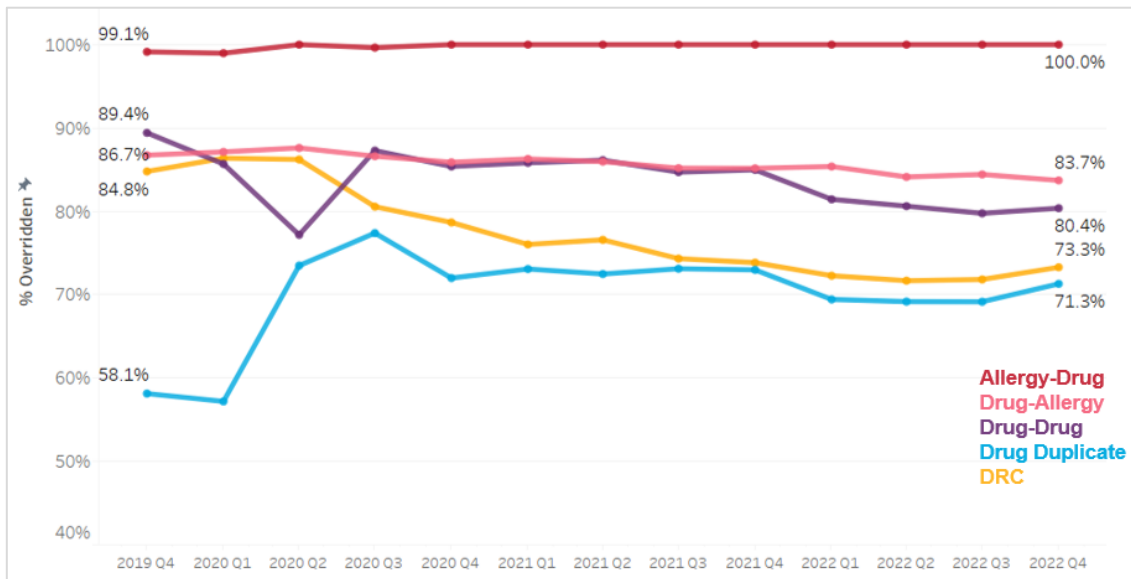
Figure 11

Figure 12

The successful alert rate for dose range checking is represented below (Figure 13)

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Successful DRC Alert Rate

Figure 13

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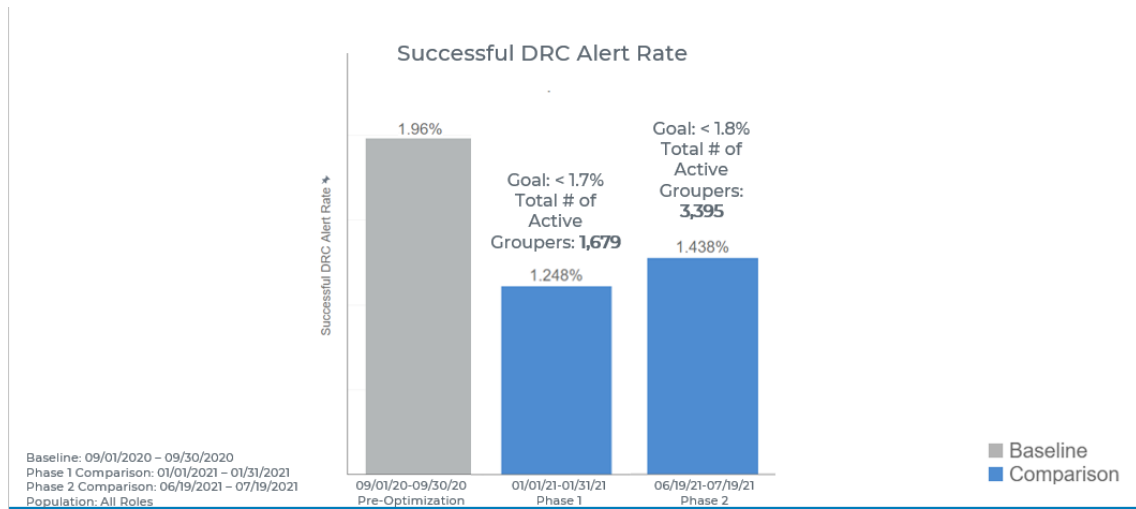
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Improving Patient Outcomes

Improvements in outcomes were achieved in several areas. Over time, physicians and extenders provided verbal feedback that the alert interruptions were improved. The utilization of SmartZone for alert management brought meaningful, non-disruptive patient context to the workflow. The optimization of mCDS assisted with the decrease in overall reported medication errors by 38%.

We are most excited by our reduction in medication error reporting (Figures 14).

- The numerator is the number of med doses in error
- The denominator is per 100,000 doses administered

Our ability to reduce nuisance alerts, add alerts that were more meaningful, and measure data in real-time were key aspects of our success.
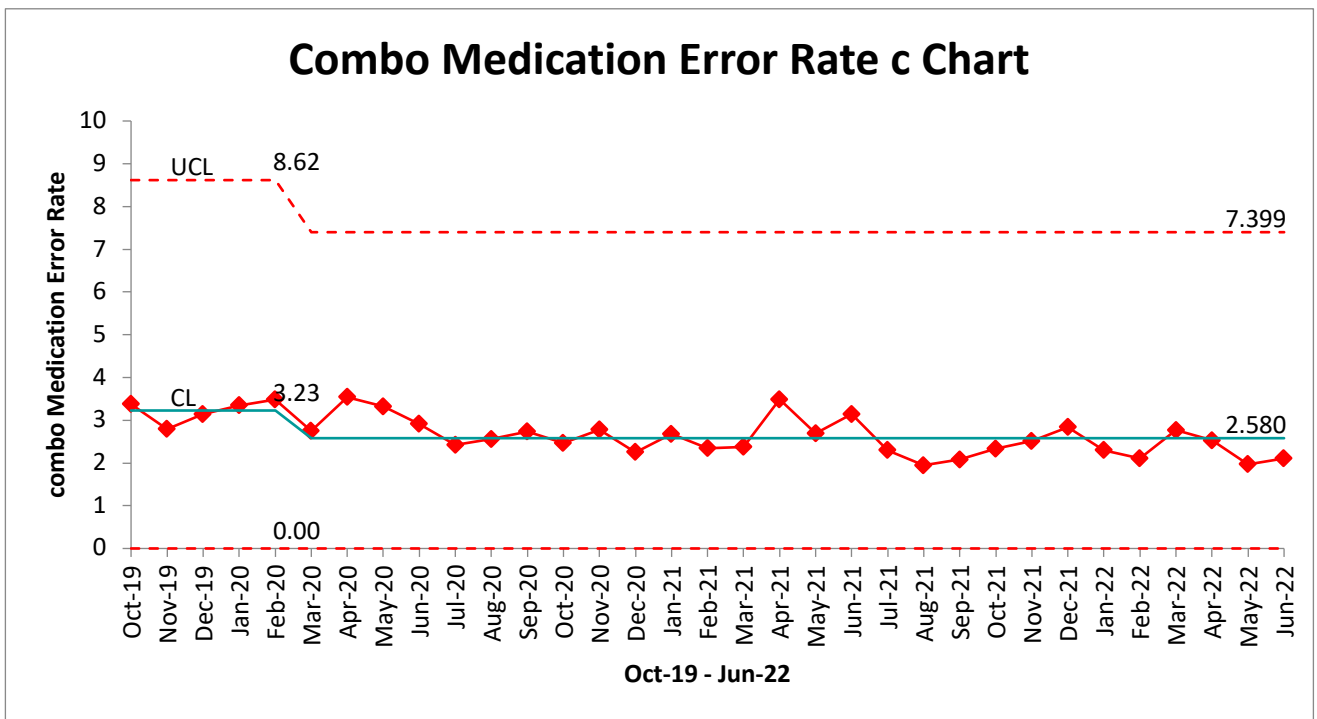

Figure 14

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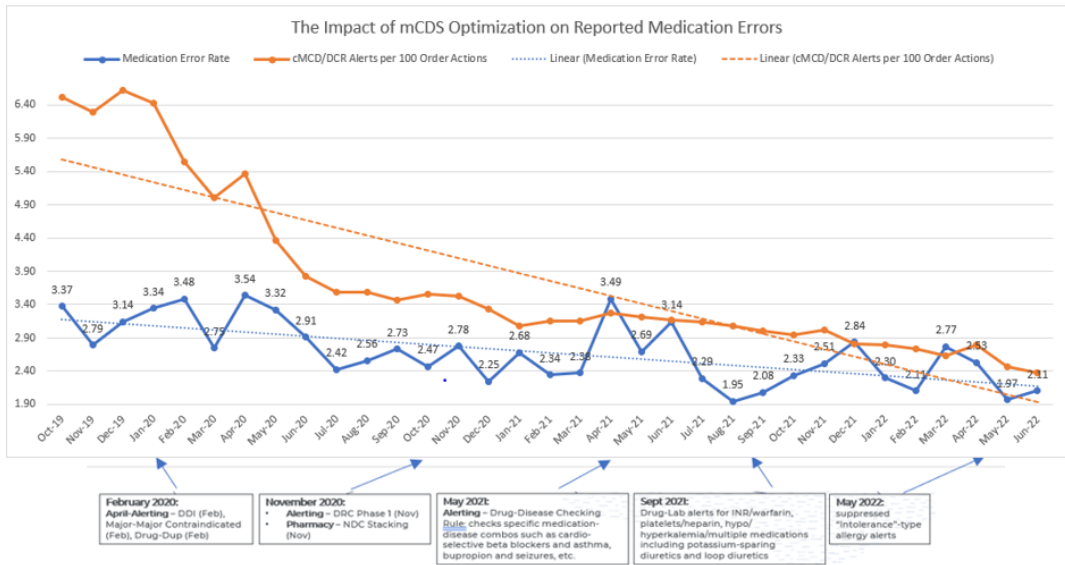
Figure 15

Figure 15 represents the overlay of the decrease in reported medication errors in conjunction with the decrease in mCDS alerts.

Northern Light Health also achieved significant improvements in our 2022 Leapfrog CPOE safety scores. Additionally, we were able to score in areas where we did not score in the past such as alerts for drug-pregnancy and hepatic insufficiency. This is a national standard and brings additional support to the self-reported medication errors data (Figure 16).

Member Org	2022 Score	% Change
NLH System Average	68%	+8%
AR Gould	74%	+21%
Blue Hill Hospital	62%	+4%
CA Dean	70%	+2%
EMMC	64%	-5%
Inland Hospital	74%	+16%
Maine Coast Memorial	66%	+8%
Mercy Hospital	60%	+8%
Sebasticook Valley Hospital	69%	+14%

Figure 16

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Accountability and Driving Resilient Care Redesign
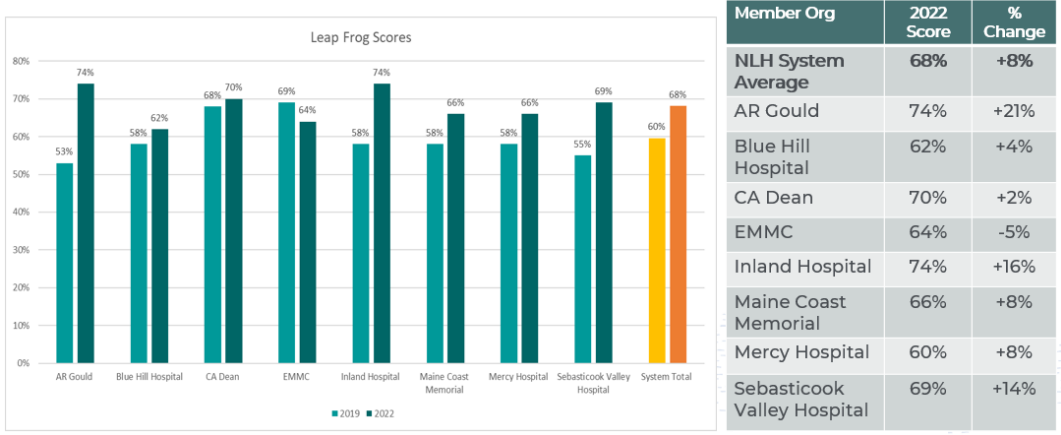
The data used for this case study began with a benchmark comparison of mCDS overrides. The data was obtained from the EHR provider Lights On Network data. The data in the reports are a byproduct of clinical documentation. The data indicated a high volume of reflexive dismissals and 40% of the overrides were deemed to be inappropriate.

Top Nuisance Alerts for Northern Light Health Providers Pre-Project

DRC Top Alerts

Single and Daily Dose Alerts
zolpidem single and daily dose max for age 65 or greater
albuterol single dose max
escitalopram daily dose max for age 65 or greater
lactulose daily dose max
phenobarbital single and daily dose max
Underdose alerting across multiple medications – added variance
Missing weight alert – updated lookback for weight

Top All Text Alerts
magnesium sulfate for CrCl < 25
potassium chloride for CrCl < 30
sumatriptan for age 65 or greater
aspirin for CrCl < 10
acetaminophen-oxycodone for age 65 or greater

DDI Top Alerts
codeine--tiZANidine ;caffeine—tiZANidine
methotrexate—amoxicillin
codeine--naltrexone ;buPROPion--promethazine ;codeine—buPROPion
cilostazol—apixaban
methotrexate—trimethoprim
codeine—clorazepate

Duplicates

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Cross-Class

ketorolac—ibuprofen; these have offsets in our PowerPlans which are not recognized during ordering

simvastatin—atorvastatin

lovastatin—atorvastatin

rosuvastatin—pitavastatin

sotalol--dofetilide

prasugrel--ticagrelor

lamiVUDine—emtricitabine

Same Agent

amiodarone (drip/bolus; transition to PO)

diltiazem (drip/bolus)

Allergy

Alerting for intolerance

We also used data from Leapfrog and will continue annual participation to continue to raise that score. Leapfrog uses a series of algorithms to calculate the CPOE safety score (Figure 17).

Implementation Status (from Leapfrog Hospital Survey Questions #3-4)	Full Demonstration of National Safety Standard for Decision Support (60% or greater of test orders correct)	Substantial Demonstration of National Safety Standard for Decision Support (50-59% of test orders correct)	Some Demonstration of National Safety Standard for Decision Support (40-49% of test orders correct)	Completed the Evaluation (Less than 40% of test orders correct)	Insufficient Evaluation (Hospital was not able to test at least 50% of test orders)	Incomplete Evaluation (Failed deception analysis or timed out) -or- Did not complete an evaluation
85% or greater of all inpatient medication orders entered through CPOE System	Achieved the Standard	Considerable Achievement	Considerable Achievement	Some Achievement	Unable to Calculate Score	Limited Achievement
75-84% of all inpatient medication orders entered through CPOE System	Achieved the Standard	Considerable Achievement	Some Achievement	Some Achievement	Unable to Calculate Score	Limited Achievement
50-74% of all inpatient medication orders entered through CPOE System	Considerable Achievement	Considerable Achievement	Some Achievement	Limited Achievement	Unable to Calculate Score	Limited Achievement
CPOE implemented in at least one inpatient unit but **<50%** of all inpatient medication orders entered through CPOE System	Considerable Achievement	Some Achievement	Some Achievement	Limited Achievement	Unable to Calculate Score	Limited Achievement
CPOE not implemented in at least one inpatient unit	Cannot take CPOE Evaluation Tool; hospital will be scored as "Limited Achievement"					

Score on Adult Inpatient Test via the CPOE Evaluation Tool (see Appendix I for details on the CPOE Evaluation Tool Scoring Algorithm)

Figure 17

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The utilization of real-time dashboards provided the capability to assess the impact of alerts in a simulation environment prior to releasing the alerts into the workflow (Figure 18).

Dose Range Checking Localization – High Impact

Figure 18

The formation of the Alert Review Committee provides an ongoing governance structure, and all alerts are reviewed by this committee. This keeps our alerting balanced and ensures we are focusing on safety and workflows.

Alerting Revision Committee (ARC):

Purpose:
- Build consensus regarding requests for new alerts or changes to existing alerts and determine the advisability of adopting those requests based on the 5 Rights of CDS and Ten Commandments for Effective CDS
- Participate in the regular review/maintenance of existing alerts
- Partner with EHR implementation teams to provide clinical expertise to support the development/design of alerting

Responsibilities:
- Provide timely feedback
- Utilize data (whenever possible) to:
    - Determine projected impact for new alerts
    - Review current state of existing alerts
- Make recommendations regarding metrics to determine the impact and adoption of alerts
- Ensure existing or new alerts are consistent with evidence-based and/or best practice standards
- Make recommendations and review education for alerts
- Determine when items should be taken to the Clinical Standards Workgroup(s)
- Assist with identification of Subject Matter Experts (SME's) who provide expertise to support the design and testing of alerts

Make recommendations that ensure:
- Enhanced patient care/safety
- Alignment with NLH's strategic vision
- Alignment with quality, patient safety, and patient experience improvement strategies
- Continuity and integrity of the care provided across the system
- Regulatory standards compliance
- Standardization is promoted

Decision Making:
- Reaching consensus is the goal
- If consensus cannot be reached, decision will be made by quorum. Quorum = 2 voting providers and 2 voting pharmacists from different member organizations.
- Escalation to the appropriate committee/group as necessary
- Conducting a vote via email is acceptable however, if discussion is required, the vote will be deferred to the next meeting

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Resources

1. Alert Fatigue | PSNet (ahrq.gov)

2. The extent and importance of unintended consequences related to computerized provider order entry. | PSNet (ahrq.gov)

3. Drug alerts and the Goldilocks principle: Striving for "just right" | American Journal of Health-System Pharmacy | Oxford Academic (oup.com)

4. Ten Commandments for Effective Clinical Decision Support: Making the Practice of Evidence-based Medicine a Reality - PMC (nih.gov)

5. The Five Rights of Clinical Decision Support: CDS Tools Helpful for Meeting Meaningful Use (ahima.org)

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