Stories of Success!
Leveraging HIT, Improving Quality & Safety

1 Title

Electronic prescribing significantly and measurably improves the quality and efficiency of patient care in a teaching-hospital's outpatient medical clinic

2 Background knowledge :

The Rochester General Health System (RGHS) in Rochester, New York consists of a 528 bed tertiary care facility, a network of over 40 private and employed, primary and specialty care practices in the area, and several care environments for geriatric patients and behavioral health needs. The Greater Rochester Independent Practice Association (GRIPA) offers web based Portal technology to over 150 physician practices, including the RGHS practices, to coordinate patient care. An additional function of the Portal currently being deployed across the system is electronic prescribing (ePrescribing). This story of one practice's experience is exemplary of many other deployments occurring simultaneously.

The Rochester General Medical Associates (RGMA) is a resident-based practice within the tertiary care facility providing internal medicine and family care services with 57 residents, 6 attending physicians and several mid-level providers across two physically separate locations on the same campus – the outpatient department (OPD) and Twig clinic. Together, the OPD and Twig see about 32,000 patients annually with about 80% of patients on Medicaid, 10% with commercial insurance, and 10% self pay.

3 Local problem :

The physical layout of staff work areas and constant rotation of residents create an inefficient environment for the timely renewal of prescriptions for the patient base. This inefficiency strains relationships with patients, pharmacies, and clinic staff as the clinic handles multiple redundant phone calls and faxes from the same patients and pharmacies inquiring about the status of their prescription renewal requests. The accumulation of duplicate requests on an inefficient system created an unsustainable burden for the staff and change was needed.

4 Intended improvement :

Electronic prescribing (ePrescribing) offered a way to improve patient and staff satisfaction, the safety and quality of patient care, and operational efficiency with an extremely limited budget and few resources. Specifically, to create a safer and sustainable, patient-centered process for prescriptions while improving documentation and regulatory compliance. The initial evaluation of the Twig and OPD workflows identified possible efficiencies resulting from technology and workflow changes. We focused on three areas – the way prescriptions were received and routed, changes in documentation practices, and increased accessibility of prescription information. Addressing these areas would dramatically increase safety with clinical decision support, improved legibility, and the creation of a durable medication list to facilitate reconciliation across care environments within the entire network. Additionally, realizing these benefits would increase staff and patient satisfaction, reduce the time to turn around prescription renewal requests, and reduce the volume of incoming prescription-related phone calls and faxes. For example, approximately 80% of the movement of charts was due to

prescription related issues. Decreasing these chart pulls would provide direct workload relief and drive efficiency by reducing the time charts were out of the medical records department – a common occurrence that frequently required significant time to track down the exact location of a given chart.

Two providers stepped forward to pilot ePrescribing and support deployment – the associate medical director in the OPD and a physician assistant in the Twig. The associate medical director had multiple demands made on her time, and ePrescribing offered her a way to drive efficiency into an already packed schedule. The physician assistant performed the bulk of renewals in the Twig and saw ePrescribing as a tunnel out of a literal mountain of charts that she handled on a weekly basis.

5 Planning the intervention

The core ePrescribing team of practice manager, providers, and nurses met four times prior to engaging in the active pilot. At these meetings, the existing workflow was diagramed to identify the best way to implement a pilot ePrescribing process. The group focused on reducing all inefficient and non-essential activities. We segregated the workflows of the nurse-provider team and began ePrescribing with the intention of rapidly identifying changes that could be applied to the general staff. Our experiences with the pilot provided valuable feedback for the general deployment. For example:

- We intended to phase in ePrescribing over 6 months according to the teams already present in the OPD and Twig, and found we could not sustain separate processes for that length of time. We trained the entire regular staff, then the 2nd and 3rd year residents as soon as possible. A long-tail approach to training was adopted whereby the barest minimum of ePrescribing function was explained in a much shorter time frame with the remainder of the training deferred until competency with the rudimentary functions was achieved. As a result of this approach, application orientation often finished within 15 to 30 minutes for residents, and 30 to 60 minutes for nurses and other support staff. The availability of regular staff and the operational demands of the clinic prevented large group education, so smaller sessions with one or two staff were done on a weekly basis – a process that took six weeks to complete. Training resident staff was more challenging since their availability was even more restrictive; 8 weeks was required. The trainer's weekly presence facilitates ongoing ad hoc training opportunities (the long-tail process) and is able to provide education and assistance with ePrescribing function as the need presents. This makes the material much more immediate by proximity of need, and retention is greatly enhanced as demonstrated by the absence of requests or problems reported for the same need in the future. As some users accelerated through the learning curve, they were able to support the trainer's efforts by providing assistance to their peers. This approach to training was easily incorporated into the clinic's schedule with the least disruption to daily processes.
- We opted not to have nurses prepare the daily schedule for providers to simplify the process. The process of a paper schedule was continued since the focus of deployment was on electronic renewal requests. The advantage of having an electronic schedule of patients available for the prescriber benefits the new prescription process to a much greater extent than the renewal process, and we needed to simplify and focus our deployment efforts.

- Nurses and providers entered medication histories, allergies, and pharmacy information on an as needed basis since they did not have time during their workday for full entry.
- We rearranged workflows to give medical records staff a prominent role in the prescription renewal process.

In short, experience from our pilot helped us prioritize the practice wide initiative to process prescriptions efficiently, produce accurate medication histories, and streamline documentation with the first step targeted on efficient prescription renewals.

7 HIT Dimensions Utilized

Staff were trained to use ePrescribing as a modular function of GRIPA's Portal, a Health Information Exchange (HIE). The HIE provided real-time access to lab values, radiology reports, practice management billing, and visit history from multiple, heterogeneous data sources using HL-7 and CCR formats. Clinical decision support provided alerts derived from clinical care guidelines and applied to the digested results of the live data feeds. For example, a patient with diabetes, identified from practice management claims, could generate an alert that a fasting lipid profile was overdue or that the HbgA1c was out of range from the population goal. Selection of a patient at the HIE level used single-sign on technology and context passing to preserve security and confidentiality while giving the user a seamless experience as they traveled through multiple applications linked to the HIE. Additionally, performance against network measures and guidelines is tracked and reported to ensure a consistent approach to patient care.

8 Outcomes

Once core staff in both sites were trained, the challenge became that of fostering durability of change as opposed to initiating change. The nurse champion in the Twig fostered that durability and altered workflows to proactively support ePrescribing. Her ingenuity, autonomy, and commitment to the technology propelled ePrescribing forward. Unfortunately, the OPD was unable to insert a champion in a similar role so a trainer's presence was needed on a weekly basis for several months to keep nursing staff familiar with basic functions. This resulted in a widening gap of ePrescriptions generated by the Twig compared to OPD of about 3:1.

Routing electronic prescriptions through the medical records staff resulted in decreased time charts were out from days to hours (sometimes minutes) and eliminated several layers of process from the paper-based workflow. The providers previously needed up to a week to renew prescriptions – mostly due to the challenges of tracking the chart – and this new workflow reduced the time to less than 24 hours in most cases. The medical records staff found the task time-neutral since less time was spent looking for charts.

Once staff began to see the benefits of ePrescribing, there was persistence of the new workflows. The turnaround time for renewal requests can be directly attributed to the number of patient complaints the practice receives daily relative to the turnaround of the patient's prescription. The consensus of the practice is that there has been a reduction in patient complaints by 50%. To date, there has been a reduction in prescription-related phone calls of 80%. The two sites combined are now generating 600

electronic prescriptions weekly, and that number is continually growing.. Since deployment, about 10% of patient medication profiles have been fully loaded, resulting in 5 minutes of nursing time saved for every prescription renewed from the medication profile. With very conservative estimates that only six prescriptions are electronically renewed each day, the value in nursing time reclaimed is $4,550 annually and climbing.

Further studies of improvement interventions would benefit from a set of pre-defined outcome measures balanced by measures that can be included as the study progresses. Outcome measures that are chosen should be prioritized by their impact on workflow with preference given to those with the least amount of staff labor involved. We found that clinical and support staff had no time to complete traditional reporting on outcome measures. As such, we turned to existing data generators such as phone and fax volume, patient complaints, and medication error reporting as a proxy to evaluate the effectiveness of the ePrescribing deployment.

Our experience argues against the use of end-users to gather or document data for outcome measures in the pilot phase. The use of a small pilot allowed us to have interactive conversations directly with the users that provided feedback in a way that documentation of data and a formal outcomes process would likely have delayed. This allowed us to get closer to the expected experience of final end users without inserting additional data collection processes that would've distorted the end-user's perception of barriers to use. While we speculate a formalized collection and analysis of the subjective pilot data would be helpful, this was lacking in our deployment.

9 Barriers Encountered

- **Hardware**: There were not enough computers or laptops. Printers required a locking mechanism that needed to be ordered. Electrical outlets were not present in work areas.
    - We obtained approval from administration for the hardware and focused on training staff with access to computers. Seven months later, we had 6 tablets and after nine months we had the required printer parts. Modifying objectives and the training strategy allowed forward momentum to continue despite this barrier.
    - The equipment obtained proved to be insufficient as proficiency with ePrescribing grew. On average, a minimum two computers is needed for every three nurses, while a 1:1 ratio is needed for providers. We did rearrange the physical layout of the work areas to enhance access to existing computers which relieved some but not all of the congestion.
- **Cultural**: We lacked a strong internal champion in the OPD for ePrescribing.
    - A combination of trainer presence, provider encouragement, and administrative encouragement were successful in developing durability with the new workflows over several months. The trainer was on site an average of 8 hours weekly, dropping to 4 hours weekly after six months and is anticipated to remain involved for up to 12 months.
    - Though not present in our experience, we speculate that a quarterly meeting of upper level administration with staff supporting ePrescribing and stressing the importance of the

initiative would greatly facilitate adoption efforts. This would be in addition to a monthly staff meeting already in place to address ePrescribing concerns.

External: Pharmacies often reported prescriptions as not received, faxed multiple renewal requests for the same drug, or faxed requests in place of sending electronic renewal requests.

- Pharmacies were contacted individually, the concerns were brought to the local pharmacy society, and clinic workflows were adjusted to minimize the negative impact pharmacies had on electronic prescribing. For example, medical records staff now check electronic renewal requests against the patient profile for the same prescription sent within a week prior and automatically delete the request if the documentation warrants.
- Prior to deployment, we met with district managers of the major pharmacies in our area. We had representation by a majority of local chain pharmacies while none of the invited independent owners attended. Orientation to our deployment process with identification of potential problems appeared to have little effect on the course of deployment with the exception of one local chain. This one chain worked closely with GRIPA to resolve ePrescribing transmission issues with their stores.
- Following the same long-tail education strategy with pharmacies appeared as effective as it was with staff. Problems were addressed directly to the pharmacist as they arose with the bulk of recurring issues diminishing significantly after the first three months. Several chronic issues regarding multiple renewal requests and prescriptions identified as not received are still being addressed at the community level through the pharmacy society.

10 Challenges Faced

Selection decisions were made prior to deployment with preference given to infrastructure flexibility and interconnectivity features. The Greater Rochester Independent Practice Association (GRIPA) held biweekly calls with the vendor to ensure the needs of the practices could be met by the ePrescribing application.

By far, the largest onsite challenge is the tri-fold nature of the deployment which consists of training the users on the technology, identifying the interim and final role the technology has in the practice workflow, and developing and communicating transitions to new workflows. The solutions we employed may find success in other ePrescribing implementation efforts such as:

Limited time for training -> Long-tail training approach

Limited computer resources -> Rearrangement of workplace and addition of equipment

Apathy -> Make small successes personal and relevant

Changing conditions in operations -> Monthly staff meeting for ePrescribing

Communication challenges -> Make practice manager, charge nurse, and medical director accountable

Different Perceptions of Goals -> Put up posters describing desired outcome (no charts)

Widening skill gap -> empower internal peer support, onsite support

An interesting challenge that presented occurred when the ePrescribing champion emerged in the Twig. Since this individual was a nurse, it made development of the leadership team problematic. Ideally, a champion would also be in an authoritative position. We addressed this challenge by continuing to holding the charge nurse accountable but allowing a delegate of her choosing to represent her in meetings. The other essential members included physician, HIM, and administration leadership.

Several references and resources were useful. The principles contained in Electronic Prescribing: Safety and Implementation book (citation below) were heavily used in this deployment. Information from the HIMSS ePrescribing wiki at http://himsseprescribingwiki.pbworks.com/ was quite useful as well.

Van Ornum M, "Electronic Prescribing: A Safety and Implementation Guide" Jones and Bartlett. 279 pages. Published 5/2008

11 Summary

Electronic prescribing was successfully deployed in a large, outpatient clinic practice in a manner that provides a solid foundation to achieve some of the expected benefits including a reduction in prescription related calls both inbound and outbound, more appropriate prescriptions as evidenced by records of cancelled prescriptions, better patient care through inpatient/outpatient transitions, and higher staff satisfaction. They have transitioned to an electronic renewal process and are well on their way to full electronic prescriptions and a durable medication record. The practice realized significant benefits with minimal impact to budget and operations. The importance of the role of the medical records department in the workflow was greatly underestimated at first, but developed into an essential component of a successful strategy.

Clinical staff have discovered and corrected many preexisting medication discrepancies and seen a significant improvement in the number of prescription errors reported. In several instances, abuse of prescription medications by the patients has been uncovered and addressed. The number of repetitive requests has dropped dramatically as prescription renewal requests are attended to in a much more timely fashion. Though a fraction of medication histories are fully loaded, time spent by nurses processing renewal requests has already been significantly reduced.

12 Interpretation

A successful ePrescribing deployment requires users with the right skills, adequate resources, and a culture open to change. The OPD and Twig clinics had a decent skill mix, a positive culture, but were resource poor with few staff, a limited budget, hardware needs, a challenging physical layout, and fractured training availability. Despite these challenges, a flexible workflow that emphasized the clinic's strengths and focused on their needs was able to be successful. This is not an uncommon

environment in healthcare, and we feel this story is broadly applicable to a large number of similar practices and institutions.

13 Conclusions

EPrescribing is a cost-effective intervention that can provide significant efficiency benefits within 6 months. The need to provide on site support in large, complex deployments for extended periods of time should be taken into consideration. Outcomes measures should be flexible and available from existing data sources as opposed to creating novel processes that are additive to the changes naturally required of deployment.

The true value of ePrescribing is expected to exceed the benefits reported here as many temporary processes were instituted to support the transition to a fully electronic medication profile. Despite the addition of temporary workflows, the practice is able to realize a significant benefit which underscores the achievement of structuring a transition that has minimal impact to existing workflows. Once the temporary workflows are dismantled, even greater efficiency and savings are expected.

14 Financial Considerations

As part of GRIPA's Clinical Integration program in Rochester New York, GRIPA provides laptops to each of the physicians to access the web based Portal which houses the ePrescribing program. The Portal connects the physician, provides real time patient information as well as producing performance reports for physicians. In the TWIG and OPD, GRIPA provided 6 tablet computers, expert ePrescribing training and continual support. All costs were covered by GRIPA in support of the network Clinical Integration program and amounted to $40,000. These costs are broken down as follows; 6 tablets - $12,000; annual licenses $13,000 ($50 per physician and mid-level and $12.50 per resident); and, $15,000 for expert ePrescribing training, Information Technology and provider relations. Calculations for GRIPA staff time for training and support is based on an average of 8 hours weekly for 3 months, then 4 hours weekly for 6 months.

An interim evaluation of the benefit revealed a reduction of the receipt of fax requests and necessary labor to sort and triage each request equates to an $8K savings on a yearly basis for both OPD and TWIG by saving 1.25 hours daily from a reduced fax volume. An 80% reduction of phone call traffic relative to prescriptions and renewal requests saved 2 hours daily and equates to a $13.6K savings on a yearly basis for both OPD and TWIG. This efficiency is calculated using an average salary of $12.50 per hour since the temporary workflows in place have not matured sufficiently to affect the clinical staff to the same degree. Accordingly, we are pleased there are immediate benefits accretive to the organization and expect significantly increased benefits as the technology becomes ingrained in the workflows.

As a result of the successful implementation of this technology, physicians and the hospital will receive incremental Medicare and Medicaid reimbursement for ePrescribing in addition to significant office efficiencies by eliminating many redundant phone calls and pharmacy faxes. In addition, there is a reduced risk of liability claims through avoided adverse drug events. For the 85 practices expected to ePrescribe in GRIPA's provider and hospital network, we estimate the annual savings and efficiencies to be approximately $2,800,000.

2% Medicare and 1% Medicaid -	$ 500,000
Efficiencies (85 practices*2.5hrs shifted*$25/hr*250 days)	$1,300,000
Reduced Liability Claims	$1,000,000