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Hospital adaptions to mitigate the COVID-19 pandemic effects on MARQUIS Toolkit implementation and sustainability

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Abstract

Objective: To explored the perceived effects of COVID-19 on MARQUIS Toolkit implementation and sustainability, challenges faced by hospitals in sustaining medication reconciliation efforts, and the strategies employed to mitigate the negative effects of the pandemic.

Data Sources and Study Settings: Primary qualitative data were extracted from a web-based survey. Data were collected from hospitals that participated in MARQUIS2 (n=18) and the MARQUIS Collaborative (n=5).

Study Design: A qualitative, cross-sectional study was conducted.

Data Collection/Data Extraction: Qualitative data were extracted from a REDCap survey databased and uploaded into an Excel data analysis template. Two coders independently coded the data with a third coder resolving discrepancies.

Principal Findings: Thirty-one team members participated including pharmacists (n=20; 65%), physicians (n=9; 29%) or QI specialists (n=2; 6%) with expertise in MedRec (14;45%) or Quality Improvement (10; 32%). Organizational resources were limited including funding, staffing and access to pharmacy students. To support program continuation, hospitals reallocated staff and used new MedRec order sets. Telemedicine, workflow adaptations, leadership support, QI team involvement, and ongoing audits and feedback promoted toolkit sustainability.

Conclusions: COVID-19 affected the capacity of hospitals to sustain the MARQUIS Toolkit. However, hospitals adapted by employing various strategies to sustain the toolkit.

Keywords

COVID-19; medication reconciliation; quality improvement; sustainability; implementation; implementation adaptation

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Competing Interests

The authors declare no competing interests.

INTRODUCTION

Hospitalized patients are at an increased risk for harmful unintentional medication discrepancies (UMDs), with care transition points (e.g., admission, unit-to-unit transfer, and hospital discharge) significantly increasing this risk.[1–8] Medication reconciliation (MedRec) reduces the risk of UMDs and adverse drug events.[6,7,9–12] MedRec implementation and sustainability is vital for hospitals' medication safety quality improvement (QI) initiatives. To address existing gaps in best practices for implementing MedRec interventions, the Multicenter Medication Reconciliation Quality Improvement Study (MARQUIS1) was conducted at five hospitals with the purpose to develop a toolkit of best MedRec practices (MARQUIS Toolkit) and to mentor its implementation at these hospitals for the study period. As part of this work, the MARQUIS toolkit was refined and qualitative and mixed-methods analysis were conducted to identify implementation barriers and facilitators of implementation.[13] Based on this work, the Implementation of a Medication Reconciliation Toolkit to Improve Patient Safety multisite pragmatic quality improvement study (MARQUIS2)[14–16] was conducted to test the effects of the refined evidence-based MedRec toolkit (i.e., MARQUIS Toolkit) on medication discrepancies in 18 diverse hospitals.

MARQUIS2 Toolkit

The MARQUIS Toolkit consists of 17 system-level interventions representing eight domains : [15]1) obtaining a best possible medication history (BPMH); 2) discharge MedRec and counseling; 3) clarifying roles and responsibilities among clinical teams; 4) patient risk stratification (e.g., using tools in the electronic health record (EHR) to identify high-risk patients); 5) improvements in health information technology (e.g., medication history taking note templates); 6) advancing access to medication resources (e.g., patient education on keeping an up to date medication list); 7) "measure-vention" which refers to determining and correcting medication discrepancies in real time; 8) stakeholder engagement (e.g., social marketing to clinicians and patients) (see previous reports for details).[14,16] Hospitals that participated in MARQUIS2 were encouraged to provide one or more patient-level interventions, performed by a trained clinician during the study period. Examples of patient-level interventions conducted by a trained clinician include: a) a BMPH in the emergency department; 2) BMPH outside of the ED if the patient as already admitted to a hospital nursing unit; 3) MedRec of admission medication orders; 4) MedRec of discharge orders; 5) patient counseling; 6) interventions targeting high-risk patients, and 7) interventions not otherwise specified (e.g. training of clinicians).

Hospitals that participated in MARQUIS2 received supporting materials in the form of an implementation manual, instructional videos, presentations to explain the study and toolkit, and a return-on-investment (ROI) calculator[17] to facilitate site-level cost-benefit calculations for use to garner local level stakeholder support. Hospitals were provided with the ROI Calculator in the form of Excel Spreadsheet. The initial site visit and subsequent monthly mentor meetings were used to provide detailed instructions on the process of completing the form and presenting it to leadership as a business case. In addition, to support implementation, a site visit occurred within the first 6 months of implementation,

four regional in-person stakeholder workshops were conducted, and peer-to-peer webinars where sites could share their implementation experiences were held. A patient and family advisory council was also established and facilitated patient and family engagement during the study period.

For the duration of the 18-month implementation period, sites were mentored by one of eight experienced hospitalists. Mentored implementation started at the first sites in April 2016 and the last sites ended mentored implementation in April 2018. The primary outcome was the total number of unintentional medication discrepancies in admission orders and discharge orders, in alignment with prior reports and the Leapfrog Group. As reported elsewhere,[15,16] of the 17 sites who collected data and were included in the final analysis, the patient medication discrepancy rate declined during the implementation period from 2.85 discrepancies/patient to 0.98 discrepancies/patient. Furthermore, a relative reduction of 5% was observed in discrepancies per month over baseline. Further analysis indicated the largest reduction in discrepancy rates (60% relative reduction) was observed in patients who received a BMPH in the ED by a trained clinician followed by trained clinicians who conducted either admission MedRec or discharge MedRec, when a BMPH was done outside of the ED, and other miscellaneous interventions.[16]

MARQUIS Collaborative

With the improvements demonstrated during MARQUIS toolkit implementation in UMDs[18], the program was expanded through the Society of Hospital Medicine's MARQUIS Collaborative, a 14-month program to implement and sustain toolkit implementation. The collaborative includes a participation fee and hospitals participating in the collaborative receive expert advice on toolkit implementation when they are connected with prior MARQUIS MedRec Collaborative staff. The program is facilitated by the Society of Hospital Medicine. The Intervention period is 14 months, with hospitals having access to an HMX online collaborative community, library of tools and resources (e.g., project timeline and milestones, site assessment tools, tools on intervention components), monthly office hours with MARQUIS experts (Dr. J. Schnipper), data collection tools and training (e.g. pharmacist training webinar; protocol on data collection tool and process), and a suite of quarterly webinars (e.g., overcoming implementation barriers). By hospitals' sustaining the components of the toolkit they implemented, long-term reductions in UMDs is possible.

COVID-19 and Healthcare Systems

Reports indicated that COVID-19 has put significant strain on healthcare systems and workers worldwide with significant disruption of in and out of hospital care, jeopardizing the health of those with acute and chronic illness.[19–26] Increased demand for patient care affected healthcare systems organizational resources as organizational priorities shifted and resources were diverted to manage COVID-19 patient care demands. The influx of severely ill patients increased the demand for intensive care services, putting further strain on existing healthcare operations.[27] This increased strain required healthcare system to adapt, including the reallocation of staff, hiring of travel nurses and support workers, and the redesign of workflow processes to integrate telemedicine.[28–30] However, there is a dearth of studies on if and how the shifting in organizational priorities and resources during the pandemic affected

ongoing organizational quality improvement (QI) initiatives. . Yet, the implementation and sustainability of QI initiatives are dependent on key contextual drivers like organizational resources (e.g., funding and staffing) and the presence of competing priorities (e.g. COVID-19).[13,31,32] Therefore, research studies are therefore needed to address existing knowledge gaps regarding the effect of the COVID-19 pandemic on healthcare systems' QI initiatives. Investigating the impact of the COVID-19 pandemic on the implementation and sustainability of the MARQUIS Toolkit provided an opportunity to address existing knowledge gaps. Therefore, leveraging an ongoing larger AHRQ-funded K01 study to determine implementation strategies and associated outcomes following MARQUIS Toolkit implementation, the research team developed targeted open-ended questions to identify if and how the pandemic affected MARQUIS Toolkit implementation.[33] The objective of this paper was to explore the perceived effects of COVID-19 on MARQUIS Toolkit implementation and sustainability and how hospitals adapted to mitigate the negative effects of the pandemic to continue to deliver safe, quality patient care via response to the open-ended questions.

METHODS

Study design, setting, and participants

A qualitative cross-sectional study design was used. The study was conducted September 2020 to February 2021. The convenience sample included hospitals that participate in MARQUIS2 (n=18) and the MARQUIS Collaborative (n=5) at the time of the study. MARQUIS2 hospitals were initially invited to participate, however, to mitigate potential low response rates given the COVID-19 pandemic, recruitment was expanded to include MARQUIS Collaborative sites. Staff who were responsible for implementing the MARQUIS Toolkit (i.e., implementation team members) were invited to participate. As noted earlier, the MARQUIS2 study was conducted 2016 to 2018 and the 14-month MARQUIS Collaborative first cohort of hospitals started in 2019.

Ethical considerations

This study was approved by the local Institutional Review Board (IRB # 170736).

Data collection procedures

Data were extracted by the PI (DPS) from a web-based study survey administered using REDCap (Research Electronic Data Capture), a secure web platform for building and managing surveys and online databases.[34,35] The PI (DPS) has worked with MARQUIS2 hospitals and was familiar with the implementation teams. Therefore, survey invitations were sent through REDCap using their email contact information. For MARQUIS Collaborative sites, the Society of Hospital Medicine, who managed the collaborative, provided the information of only one key individual at each collaborative site and this person was sent the recruitment email including the survey link.

To achieve the objective of this study, targeted open-ended questions were included with the main AHRQ-funded K01 study survey to elicit qualitative responses from participants. The approach of using surveys to gather qualitative data was taken for practical purposes

and because prior reports indicated that online surveys can effectively be used as a qualitative research tool.[36] Furthermore, being mindful of the pandemic and associated resource constraints, the number of questions were limited to reduce the time required to complete the entire survey and to limit response burden. Potential respondents received a recruitment letter with a link to the web-based survey. Participants completed an initial screening question to establish eligibility followed by an IRB-approved eConsent form. Once consented, participants accessed the survey questions and answered questions without an interviewer present. Participants could contact by phone or email the study PI (DP) to address any questions.

Data analysis

Qualitative data were analyzed using thematic content analysis. Data were downloaded from REDCap into a qualitative data analysis template developed by local qualitative experts. Two coders (BR and AJ) coded the data in Excel with a third coder (CM) assisting to resolve coding discrepancies. Using the study's conceptual model, codes were organized into two major themes (i.e., organizational factors; program design and implementation factors).[37]

RESULTS

Sample

Thirty-two MARQUIS 2 implementation team members and five MARQUIS Collaborative individuals responded to the survey. Response rate for MARQUIS2 sites were 21% (32/155) and for the MARQUIS Collaborative sites was 100% (5/5). Of those who responded, three participants were eligible but did not complete consent, one did not complete the screening questions, one participant survey was incomplete and one survey was a duplicate and excluded. The final sample included in the analysis was 31 team members, representing fifteen MARQUIS2 sites and four MARQUIS Collaborative hospitals. Most respondents were pharmacists (n=20; 65%), physicians (n=9; 29%) or QI specialists (n=2; 6%). The majority reported expertise in MedRec (14;45%) or Quality Improvement (10; 32%). Three participants indicated "Other" as their area of primary expertise; one as Division Chief, one as Quality and Compliance, and one as "Clinical". In ten instances, only one person from a hospital responded, however, as the key informant approach indicates, meaningful information was still generated.[38,39] Presented below are details for each major theme with sub-themes with representative quotes including in Table 1.

MARQUIS Toolkit Interventions affected and improvements observed after the pandemic

The qualitative data indicate that while some hospitals were able to continue their MedRec interventions during COVID-19, others struggled to continue to do so. Two interventions specifically affected include continuing to conduct medication histories (BMPH) and collecting data for audit and performance to support ongoing quality improvement initiatives. One site reported the toolkit not being used due to the lack of pharmacy staff to conduct MedRec. Two sites reported not being able to sustain long-term the MARQUIS BPMH intervention adopted initially while another indicated that the toolkit was no longer used to maintain their medication history program. The data does not indicate if these two sites "re-implement" MARQUIS after the pandemic or long-term.

Resource limitations resulted due to the shifting of resources to care for patients during the pandemic, pharmacy students no longer being available on site to assist with MedRec, and limited availability of pharmacy staff. At one site, workflow changes resulted in the centralization of pharmacy staff and subsequent reduced staffing to conduct MedRec. This site adapted by training the ED admission's nurse to conduct medication histories. Hospitals also reported adapting from obtaining in-person BMPH to using in-patient video visits and phone calls to obtain these medication histories. Because of staffing limitations, the collection of performance metrics to support audit and feedback processes were suspended at some sites and the depth of data collection was decreased.

Since the pandemic, many sites were able to expand their services more widely. For example, risk-stratification to identify patients at high-risk for medication discrepancies were expanded hospital-wide. One site reported expanding their MedRec services and reducing pharmacist workload by training pharmacy learners and integrating them into the medication history taking processes. Some sites have also taken steps to sustain the MARQUIS Toolkit interventions in several ways. One site who reported not using the toolkit during COVID-19, subsequently hired pharmacy technicians to conduct MedRec in the ED. Many other sites reported ongoing efforts to support BMPH including training to facilitate ongoing staff competency in BPMH, developing a verbal communication tool to optimize information gathering, staff working from home to continue the medication history service, and policy changes to allow pharmacy technicians to write notes in the EHR. . One site reported decentralizing pharmacy staff, introducing new pharmacist shifts, and clarifying discharge medication counseling as a role expectation to enhance MedRec. Another site allocated a MedRec pharmacist to provide discharge counseling. To facilitate obtaining program metrics, sites created "Lead Tech" position for a pharmacy technician to facilitate data collection and program audits, used pharmacy residents to support MedRec and collect performance data, or changed workflow to collect data in ways that would reduce manual labor.

The Negative Effects of COVID-19 on MARQUIS Toolkit Sustainability

Lack of institutional support and program oversight.—Participants reported the lack of institutional support stemming from a lack of clarity related to the spreadsheet used during MARQUIS for data collection. Difficulty understanding the spreadsheet limited its use to explain the MARQUIS program to organizational leadership and for champions to use. Use of the toolkit was impeded because of this lack of clarity which negatively affected the collection of data to track outcomes from toolkit implementation. Furthermore, participants noted that competing priories made sustaining attention to MedRec difficult, decreased program funding to support ongoing monitoring and oversight and to the ability to acquire additional staff remained limited. Oversight challenges included the pandemic affecting MedRec audits and collecting data for QI purposes to obtain performance metrics from toolkit implementation.

Limited program resources—Program resources such as staffing levels, time, and funding were severely affected by COVID-19. The COVID-19 pandemic also affected the use and distribution of personnel to do MedRec, which affected MedRec workflow and

documentation. Compared to before, medication history technicians had to work closely with nursing to obtain relevant information, including patient contact information in order to call patients or family to obtain information. In other instances, due to the pandemic personnel were reallocated away from MedRec initiatives. When pharmacy students were pulled away from clinical duties in settings where there was a reliance on pharmacy students to support MedRec, the ability to complete medication histories became problematic and affected MedRec efforts. At another facility, pharmacy school students were used to assist with data collection for audit purposes when pharmacy staff was not available. A reduction occurred also in future staffing for MedRec. Some hospitals used pharmacy students to fill the gap, but was this was only possible when students were available. With reductions in pharmacy staffing levels, less time could be dedicated to medication histories and reconciliation. Availability funding to support staffing for MedRec was problematic during the pandemic as additional FTEs could not be added despite using data to support the need for additional staffing.

Strategies to Facilitate MARQUIS Toolkit Sustainability

Workflow adaptations: Telemedicine, decentralization, and EHR adaptations— To sustain the MARQUIS Toolkit MedRec interventions, a shift to telemedicine was crucial. Telemedicine in the form of video visits, telephone calls, and use of a voice mailbox became a central focus for hospitals with medication histories being done by phone. Pharmacy staff conducted virtual patient interviews and phone calls to obtain the BMPH which is crucial for MedRec practices. Workflow adaptations from in-person to telephone-based medication histories occurred. For example, at one site, a voicemail box was set up to allow providers to call and indicate the need for pharmacy staff to conduct a medication history on a patient. At another site, due to the inability to spend extensive time with patients to conduct a medication history, at times external pharmacies were called to facilitate more in-depth MedRec.

On participant highlighted the need for decentralizing MedRec practices and how providers placed orders for MedRec. EHR adaptations were also instrumental in continuing MedRec practices. The use of templates and screens were highlighted by one facility. Other steps facilities took included enhancing discharge MedRec screens in the EHR and streamlining how providers ordered MedRec services.

Obtaining hospital buy-in, leadership support, and policy changes— Institutional support was garnered through demonstrating the effectiveness of the toolkit. Being able to show the effectiveness of the program generated more buy-in and the upscaling of resources. Institutional support came in the form of leadership support and the involvement of the quality team which were important for sustainability and program expansion. Interdisciplinary work was also valued. Policy changes that allowed pharmacy technicians to make changes in the patient medication list, document in the EHR, and structural EHR changes were continued to support ongoing MedRec efforts.

One site highlighted how their work during MARQUIS resulted in policy changes at the state level, which ultimately facilitated the sustainability of work initiated during MARQUIS Toolkit implementation. Policy changes at the local level that allowed pharmacy technicians

to make changes in the patient medication list, document in the EMR, and structural EMR changes were continued to support ongoing MedRec efforts.

Staffing, budgetary support, and training—The use of pharmacy students off-set the workload of pharmacists who could focus on more critical patient safety issues. Pharmacy technicians were also moved to the emergency department to support MedRec efforts. One facility asked for more pharmacy technicians but some barriers (e.g., cost and administrative interest) remains. Another facility reported acquiring permanent positions for pharmacy technicians who could perform MedRec and expanding the program to all units in the hospital.

Hospitals also educated pharmacy students and integrated them into the pharmacy team to facilitate medication history taking. Noted as important was a continued effort to train staff on aspects of MedRec, such as obtaining a best possible medication history (BPMH), and using training materials to strengthen their programs. One site noted that ensuring staff are educated and trained in MedRec and toolkit use and advocating for additional funding for the program to achieve sustainability were important and the availability of training materials surrounding the MARQUIS toolkit also strengthened their program.

Ongoing monitoring and oversight—The importance of ongoing monitoring and oversight was highlighted as important for program sustainability and staff performance. One participant noted that periodically, reminders on various aspects of MedRec performance was necessary to ensure errors did not occur with a negative effect on program metrics.

Enhancing medication safety during the pandemic: transferable actions from MARQUIS Toolkit implementation—During the pandemic hospitals predominantly focused on strategies to support existing MedRec initiatives and continuing the MARQUIS Toolkit rather than initiating new programs. However, two strategies were added to enhance medication safety. At one hospital, the risk stratification tool that was used during MARQUIS2 implementation, was also used to risk stratify COVID-19 positive patients. This included the development of risk stratification tools in the EMR for COVID-19 patients. Another site generated a new order set for patients with no medical reason for admission to ensure home medications were not overlooked.

LIMITATIONS

The primary limitation of the study is the small sample size. The sample size was limited to the number of hospitals that participated in the MARQUIS 2 study and the MARQUIS Collaborative, limiting the generalizability to other settings due to potential for selection bias. Although we invited all implementation team members at each site to participate in the survey, the number of respondents per site was limited. However, team members were experts were deeply engaged with and highly knowledgeable of MARQUIS Toolkit implementation. Their use in this study aligns with prior research and the use of a key informant in survey research as a valid approach to assessing organizational performance.[38,39] Despite these limitations, this study t is the first to describe the perceived

effect of COVID-19 on sustainability of MedRec interventions and steps hospitals took to COVID-19 challenges. Acknowledging sustainability of EBP as a dynamic and continuous process is an important consideration when implementing a new intervention. Proactive planning for unforeseen events before and if they occurred may strengthen sustainability efforts and advance the science of sustainability within a complex and ever-challenging health care climate.

DISCUSSION

This study demonstrates the impact of COVID-19 on MARQUIS Toolkit sustainability and strategies implementation team members initiated to mitigate the negative effects of the pandemic. Among the hospitals in our study, COVID-19 was a destabilizer that necessitated strategies to mitigate barriers to sustain the MARQUIS Toolkit, Yet, it also prompted new strategies to enhance medication safety during the pandemic including updates to the EHR, use of telemedicine, and staff reallocation.

Lack of institutional support and program oversight and limited resources are inner context factors limiting sustainability. Prior research has demonstrated the association between funding, staff involvement, and demonstrating program results and program sustainability.[31] Similar to a recent study conducting cognitive task analysis and focus group with physicians and inpatient staff pharmacists to understand factors affecting MedRec execution this study identified competing clinical tasks and time limitations as MedRec barriers during the pandemic of include[35]. The lack of resources affected both the availability of staff and thus the extent to which MedRec could be performed at some hospitals. Given that MedRec reduces the risk for UMDs,[10,40] when MedRec becomes limited in the hospital the risk for discrepancies increases, placing patients at risk for adverse medication events. A recent scoping review[41] emphasized the diversification of the pharmacist's role that occurred during the pandemic to minimize potential negative effects. The scoping review of 11 articles found that the role of the pharmacist during the pandemic was diversified to focus on infection control and disease prevention, adequate storage and supply of medications, and providing patient care and support health professionals. Diversifying the pharmacist role during the pandemic provided support to patients and health professionals, but it likely also reduced the availability of pharmacy staff to complete MedRec activities like taking patient histories. The current study supports this, in that when pharmacy staff and students were pulled away from MedRec activities to support other organizational activities during the pandemic, leaving little time for them to preform MedRec and possibly reduce UMDs.

The lack of institutional support and program oversight made it difficult to demonstrate positive program outcomes and thus advocating for MedRec program continuation. The lack of institutional support reflects previous reports of where budgetary support for MARQUIS Toolkit implementation limited toolkit sustainability.[13] Without institutional support, obtaining the necessary resources to support toolkit sustainability was problematic, thus limiting toolkit implementation and sustainability. Obtaining performance metrics as part of audit and feedback processes, an important strategy to facilitate implementation and long-term sustainability, was also impeded due to resource limitations.

A recent systematic review by Penno and colleagues identified relevant factors for sustainability of evidence-based practices in acute care settings.[42] They identified seven themes including the characteristics of the innovation/EBP, adopter/user factors, leadership/management influences/factors, inner context (practice setting/organization), inner processes (processes, methods, systems, structures, strategies), outer context or broader system factors, and outcomes.[42] Using this framework, the current study similarly identified important contextual factors as hospitals work to sustain MARQUIS Toolkit implementation. Hospitals took several steps to sustain MedRec efforts during the pandemic aligning with the *inner context* (policy; financial), *inner processes,* and *leadership and management* of the framework of sustainability. *Inner context* factors include policy changes at the local and state level that supported ongoing MedRec efforts while financial support allowed some sites to hire additional pharmacists to assist with MedRec. Sustainability strategies also included the *inner processes* of education and training and project structures and systems to monitor/manage MedRec. Workflow adaptations included shifting to telemedicine (e.g. phones, virtual interviewing) for collecting medication histories, using a voicemail box for pharmacy staff for when medication histories were required, decentralization of discharge MedRec and creating new pharmacy shifts with pharmacists doing discharge MedRec. Training new staff, training materials, and making workflow adaptions remained a priority to sustain MARQUIS toolkit. Some sites were able to continue project oversight with audits and creating a position to support data collection for metrics.

Hospitals also engaged *leadership and management* strategies by obtaining leadership buy-in and support. Many of the sites highlighted the need for staff training and education to support and enhance compliance of existing staff engaged in MedRec practices. Studies and conceptual models on sustainability highlight the need for leadership support as an important factor supporting program sustainability.[43–45] As the decision-makers for the distribution of organizational resources, leadership buy-in and support of MedRec initiatives are crucial for long-term sustainability.

The adaptations hospitals made during the pandemic to support MedRec and toolkit sustainability reflect another common construct, the *evolutionary nature* of sustained EBP over time.[42] As hospitals endeavored to maintain MedRec processes, the adaptations made reflect the organizational commitment to sustaining evidence-based interventions despite significant external challenges.

CONCLUSIONS

COVID-19 threatened patient safety by putting stress on the implementation efforts of hospitals that participated in MARQUIS2 and worked to sustain the quality improvement MedRec toolkit intervention. Efforts included garnering institutional support, continued funding for resources, and adapting work processes. During COVID-19 the increased use of telemedicine to facilitate MedRec was crucial to communicate with patients and other sources of information (e.g. caregiver, community pharmacist) for the most up to date medication information.

IMPLICATIONS

The COVID pandemic has forced hospitals to quickly develop structures and processes to ensure the continuity of patient care but limited resources required the prioritization of COVID-19 patients. New and unexpected MARQUIS Toolkit implementation barriers during COVID-19 required hospitals to quickly adapt and develop strategies such as telemedicine, redistribution of faculty and students, and EHR accommodations to successfully overcome barriers and sustain toolkit implementation. The lessons hospitals learned during the pandemic to address barriers should support the development of policies and procedures to support care delivery when the system is challenged by emergency conditions like pandemics. Healthcare systems should allocate resources and define the scope of work for their QI departments during emergencies to ensure quality of care is delivered to those patients with emergent needs while not sacrificing the needs of patients with chronic conditions or other organizational QI priorities.

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Ms. Abigail Jones served as research assistant on the project and worked on different research studies while at Vanderbilt University School of Nursing. Ms. Jones is currently pursuing graduate studies to become an acute care nurse practitioner.

Dr. Cathy Maxwell

Dr. Maxwell’s research is directed at understanding outcome trajectories of older adults related to functional decline and frailty. Dr. Maxwell has examined outcomes in relationship to older adults’ frailty status and reported one-year outcomes of older adults hospitalized for an injury (falls), including functional decline, readmissions to acute care and mortality.

Dr. Deonni Stolldorf

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Table 1:

Qualitative Themes and Representative Participant Quotes

The Negative Effects of COVID-19 on MARQUIS Toolkit Sustainability	
Lack of institutional support and program oversight.	
Lack of support	"*We do not use the Toolkit to maintain [sic] Medication History program … The Toolkit utilization was impeded by lack of clarity in the definition and utilization of the spreadsheet. Conceptually it is understood, but is very difficult to explain to administration, stakeholders, and difficult for the champions to utilize. This impedes or undercuts the utility of the ultimate measure, that is published and trended."* *(Pharmacist, MedRec).*
Competing priorities	"*Difficult to sustain the attention on this effort due to several competing and urgent priorities." (Physician, QI)* and the "*Financial impact of COVID has reduced our likelihood of additional FTE support near term.* *(QI Specialist, QI)".*
Oversight challenges	"*There have been several months we have been unable to obtain audit data." (Pharmacist, Quality and Compliance)* and another noted *"The pandemic … has affected our ability to acquire ongoing performance metrics as data analysis and acquisition has changed its focus."* *(Physician, Administration-Chief of Division).*
Limited program resources	
Program resources: time, staffing	"*Time constraints and resources have impeded on sustainability."* *(Pharmacist, MedRec).* "*Limited pharmacy staff has contributed to less time dedicated to complete medication histories and medication reconciliation* *(Pharmacist, MedRec)".*
Staffing limitations	"*Staffing resources have been allocated to COVID-19, therefore presenting workflow challenges to sustain completion of MecRec documentation."* *(Collab Participant 2, Pharmacist, MedRec).*
Staff reallocation	"*We had to reallocate staff to key areas and medication reconciliation took a back seat.* *(Pharmacist, MedRec)".*
Use of pharmacy students	"*The availability of students ceased in April and has not returned to previous levels.* *(Pharmacist, Quality and Compliance)".*
Funding	"*Financial impact of COVID has reduced our likelihood of additional FTE support near term."* *(QI Specialist, QI)* and "*We have tried to use outcomes data (mortality and length of stay) to help* [sic] *argument for additional FTE* [full-time equivalent] *support. FTEs have not been approved to date."* *(QI Specialist, QI).*
Facilitators of MARQUIS Toolkit Sustainability	
Workflow adaptations	
Telemedicine	"*To minimize the risk of exposure, we shifted from in-person medication history interviews to telephone based. We have staff available to complete in-person interviews if needed.; however, we primarily do telephone-based interviews. We still use two sources to verify the medication history."* *(Pharmacist, MedRec).* "*Inpatient video visits were started to help have conversations with our hospitalized patients without requiring face-to-face visits.* *(Physician, Quality Improvement)".*
Decentralization	"*Decentralization of discharge medication reconciliation and creation of new pharmacist shifts where discharge medication reconciliation is part of their* *[Pharmacy staff]* *"role/responsibility - Streamlining the way providers place requests [PharmTechs] to perform admission med rec."* *(Pharmacist, MedRec).*
EHR adaptations	"*We changed EHR templates to facilitate improved med rec practices"* *(Physician, Quality Improvement).* Other steps facilities took included *"Enhanced discharge medication reconciliation screens in* [EHR]" *(Pharmacist, MedRec)* "*Streamlining the way providers place requests* [PharmTechs] *to perform admission med rec. (Pharmacist, MedRec).*
Obtaining hospital buy-in, leadership support, and policy changes	

Hospital buy-in: demonstrate effectiveness	*"We have used the tool kit to demonstrate to leaders the effectiveness of a multidiscipline medication reconciliation team. The tool kit has helped highlight our success with improving patient care as well as aid to identify opportunities for improvement. Training materials have been most valuable to strengthen our program and our team" (Collaborative participant 2, Pharmacist).*
Leadership support	*Quality team involvement with multidisciplinary work and support from larger hospital leadership to support maintenance, but more so expansion to other areas. (Pharmacist, Clinical)".*
Policy changes	"*Techs are now writing notes in [EHR]… '. (Pharmacist, MedRec).* "*During MARQUIS 2, we created an automated risk stratification tool to identify high-risk patients. We completed medication histories for high-risk patients on 6 of our hospital units. Our experience here with MARQUIS 2 was instrumental in getting the* [state senate bill X] *pass, which requires pharmacy staff to complete medication histories for high-risk patients upon admission. Using the risk stratification tool and the new* [state senate bill X]*, we expanded hospital-wide for all high-risk patients." (Pharmacist, MedRec).*
Staffing, budgetary support, and training	
Staffing	"*Educating pharmacy learners and implementing them into the medication history process to expand services as well as offset the workload of staff pharmacists to handle more critical patient safety issues." (Pharmacist, MedRec).*
Budgetary support	"*Since completion, we acquired permanent positions for pharmacy technicians who perform medication reconciliation and expanded it to all of the units within our hospital focusing on high-risk patients." (Physician, Administration-Chief of Division).*
Training	"*Ensured staff competency and training and ongoing budgetary funding for continued success." (Pharmacist, Program Implementation).* "*Training materials have been most valuable to strengthen our program and out team." (Collab Participant*
Ongoing monitoring and oversight	
Oversight	that "*Periodically reminders are needed for various aspects of their expected performance. People overtime tend to develop bad habits or become slack in their performance. As that occurs, errors rise and metrics decline. We have created a "Lead tech" position to assist in data collection and auditing." (Pharmacist, Quality and Compliance).*
Enhancing medication safety during the pandemic: transferable actions from MARQUIS Toolkit implementation	
Risk stratification	"*The same EMR tools that were developed during MARQUIS implementation were also employed to risk stratify COVID positive patients. (Physician, Administration-Chief of Division)".*
Order set	"*We have a new order set for patients with no medical reason for admission. Completing a BPMH to ensure home medications are not overlooked while patients are in ER waiting for PT/OT/home care to be arranged., was included by our ER docs." (Physician, MedRec).*