A Process of Acceptance of Patient Photographs in Electronic Medical Records to Confirm Patient Identification

SayedObaidullah Aseem, MD, PhD; Basem M. Ratrout, MD, MHA; Scott C. Litin, MD; Ravindra Ganesh, MBBS, MD; Ivana T. Croghan, PhD; Matthew S. Salerno, MBA; Andrew J. Majka, MD; Darryl S. Chutka, MD; Ryan T. Hurt, MD, PhD; Haitham S. Abu Lebdeh, MD; Ann Vincent, MD; and Sanjeev Nanda, MD

Abstract

Appropriate patient identification is a critical component of safe health care delivery. With increasing reliance on electronic medical records (EMRs), errors of test ordering and documentation have become commonplace. Incorporating patients' photograph in the EMR has considerably decreased error frequency and improved health care delivery by making it easier for physicians to identify a patient. We conducted a survey of all 35 physicians working in the Executive Health Program to determine the importance of having patient photographs in the EMR. Of the 35 physicians who received the survey, 26 (74.3%) responded, 24 (92.3%) of whom agreed that it was important to improve patient identification, care, and safety. Based on these data, we implemented a quality improvement project to increase the percentage of new patients having a photograph included in the EMR. Our goal was to increase photograph inclusion by more than 20% from baseline within 6 months without any unintended consequences (ie, not slowing down any of the workflow during the intake process). The intervention took place between June 1, 2015, and February 8, 2016. Using Define-Measure-Analyze-Improve-Control models, the baseline rate of photographs in the EMR was 49.5% (302 of 607). We initiated 3 Plan-Do-Study-Act cycles targeting awareness and data sharing campaigns. After the Plan-Do-Study-Act cycles, the weekly rate of patient photographs incorporated into the EMR was at 71.4%, which was significantly improved compared with baseline (F test, $P<.001$). No unintended consequences were identified. Increased inclusion of patient photographs in the EMR aided in patient identification and improved staff satisfaction with minimal interruption to workflow.

With increasing use of electronic medical records (EMRs), errors of documentation and orders for patients have become more frequent.[1,2] Improper identification can result in treatment errors and wrong-person procedures, as well as privacy violations, billing errors, insurance fraud, and even identity fraud. In fact, it has been noted that many health care facilities rely on the use of names and birthdates for identification of EMR charts and yet there are occasions when individual patients in the same facility share the same name and birthdate, contributing to EMR mix-up. According to one study, 24% of reported errors were due to placement of electronic orders in the incorrect patient's chart, comprising the second most common cause of care provided to the wrong patient.[3] Other studies have found that health care professionals frequently fail to actively verify patients' identification before placing orders or documentation in their medical record.[4,5] In one study by the US Department of Veterans Affairs National Center for Patient Safety from January 2000 to March 2003, the investigators found that failure to correctly identify patients resulted in medication errors, transfusion errors, testing errors,

From the Clinician-Investigator Training Program (S.A.), Executive, Development, and International Medicine Program (B.M.R., S.C.L., R.G., M.S.S., A.J.M., A.V., S.N.), Division of General Internal Medicine (B.M.R., S.C.L., R.G., I.T.C., M.S.S., A.J.M., R.T.H., H.S.A., A.V., S.N.), and Division of Preventive, Occupational, and Aerospace Medicine (D.S.C.), Mayo Clinic, Rochester, MN.

wrong-person procedures, and discharge of infants to wrong families.[6] Because of the potential for errors, correctly identifying patients has been listed as the primary objective of the Joint Commission's National Patient Safety Goals.[7]

Most EMRs do not have built-in error prevention capabilities,[2] and therefore, a number of solutions have been proposed to prevent such errors, mostly in the design of EMR software. One potential solution is incorporation of patient photographs in the EMR to prompt health care professionals to identify the correct patient. This approach has been reported to drastically decrease errors of placement of orders in unintended patients' medical records.[2,8]

Patient selection errors are unfortunately common in the primary care setting, with an estimated incidence as high as 23%[3] and a prevalence of 889 reported events in the first 6 months of 2016 in the state of Pennsylvania alone.[9] These patient selection errors have been postulated to be secondary to a combination of factors that interact at the computerized provider order entry system that are largely related to poor patient identification.[10] A single-center trial in 2012 evaluated the impact of an order verification screen that featured the patient's photograph on the reduction of errors secondary to incorrect patient identification. The baseline error rate before intervention was 23%, which was reduced to 0% in the charts containing a patient photograph.[3] Similarly, in a simulation scenario evaluating the impact of highlighted patient data, inclusion of a patient photograph, and a combination of the 2 interventions on identification of patient selection errors, an increased recognition in patient selection errors was found both with photo inclusion only (43%) and with a combined intervention (63%) compared with 7% in the control group.[11]

The purpose of this report is to present the rationale and approach to increasing the inclusion rate and acceptability of patient photographs in the EMR.

METHODS

Purpose
This quality improvement project was aimed at increasing the rate of inclusion of patient

photographs in EMRs. The clerical staff was crucial to the project implementation as they directed patients to have their photograph taken and incorporated the photo into the medical record. For the patients' convenience, the photographs were taken on the same floor as the patient's appointments and the service was provided at no charge by the medical institution. The intervention took place between June 1, 2015, and February 8, 2016.

Design
This was a quality improvement project housed within the executive medicine division without external funding or support. Desk operations staff, supervisors, and project physicians were identified as major stakeholders and invited to organizational meetings to assess the amount of clerical burden that would be created, additional equipment necessary for implementation, and potential barriers to project implementation. Because no major barriers were identified, the project was deemed feasible and the implementation survey to physicians before project initiation was undertaken via email using Research Electronic Data Capture (REDCap) software. Given the overwhelming positive response to the survey, we again met with the major stakeholders and designed the first Plan-Do-Study-Act (PDSA) cycle.[12]

Physician Presurvey
A preintervention survey was sent to all 35 physicians practicing in the executive medicine division before the start of any project activity to determine their interest in this project. The survey response was a binary Yes/No to the question, "Would having a picture of your patient in the left upper corner of the electronic record be helpful in responding to phone messages and other issues of patient care?"

Statistical Analyses
Using Define-Measure-Analyze-Improve-Control models, the baseline rate and variability of the rate of photographs included in the EMR were measured. The data were managed using the REDCap tool hosted at Mayo Clinic.[13] Data analyses were conducted using JMP statistical software, version 14.1. (SAS Institute).

Outcome of Interest

The outcome measured was the percentage of new medical records with a patient photograph present. Weekly log reports were performed on all new patient records, and the number of records with a photograph was expressed as a percentage of the total new patients that week.

Strategy

Our SMART (Specific, Measurable, Attainable, Relevant, and Time-Framed) aim was to improve the inclusion of patient photographs in the EMR by more than 20% over baseline without unintended consequences. Unintended consequences were perceived to be major alterations to workflow or invasion of patient privacy. In order to achieve this goal, we undertook 3 PDSA cycles.

The first PDSA cycle provided visual cue cards to patients. These cards reinforced the importance of having a picture in their medical record to aid in proper identification and provided options for them to do so. We also specifically addressed potential privacy concerns.

The second PDSA cycle included face-to-face informal meetings of the project team, the front desk operations staff during the clinical staff meetings. During these meetings, we celebrated the improvements made thus far and the increased awareness of the importance of patient photographs to the provision of better care. The clinical staff provided the project team with feedback on proposed improvements to implementation and made changes to workflow that made it easier to capture a patient photograph at the time of check-in for their medical appointment.

The third PDSA cycle shared the improvement in patient photograph inclusion with clinical staff. Weekly results were shared in staff meetings, on a notice board, and in the form of a poster. We again assessed barriers to implementation and encouraged ideas to streamline workflow. We then encouraged staff to continue with their improved process.

RESULTS

Physician Preintervention Survey

Of the 35 physicians who received the REDCap survey, 26 (74.3%) provided

responses. Of these 26 respondents, 24 (92.3%) supported the inclusion of a patient photograph in the EMR to improve both patient care and safety (Figure 1).

Preintervention Rate of Photo Inclusion

The mean preintervention weekly measurement of the rate of photograph inclusion in the EMR was 49.5% (302 of 607) (Figure 2, blue line). Based on this data, we established the goal of increasing the rate of photo inclusion in the EMR by 20%, with a target rate of 70% or greater within 6 months of intervention.

Effect of PDSA Cycles

Plan-Do-Study-Act cycle 1 (Figure 3A) was implemented for 9 weeks and resulted in a photograph inclusion rate increase from 49.5% (302 of 607) to 59.4% (190 of 320). However, after this 9-week period, photograph inclusion rates started to regress to previous levels.

Plan-Do-Study-Act cycle 2 (Figure 3B) was then implemented for a further 6 weeks, resulting in a further increase in photograph inclusion rate to 74.7% (183 of 245). Again, we noted that after this 6-week intervention, photograph inclusion rates were regressing toward previous levels, albeit at a lower rate than with PDSA cycle 1.

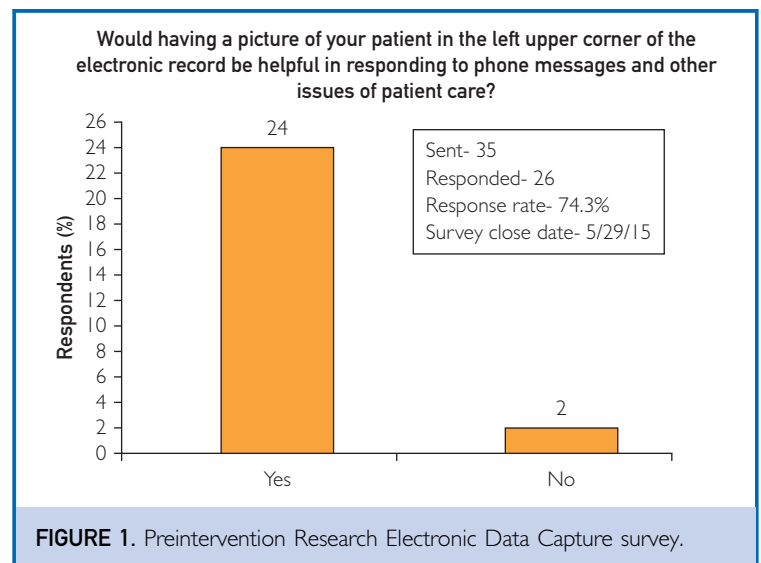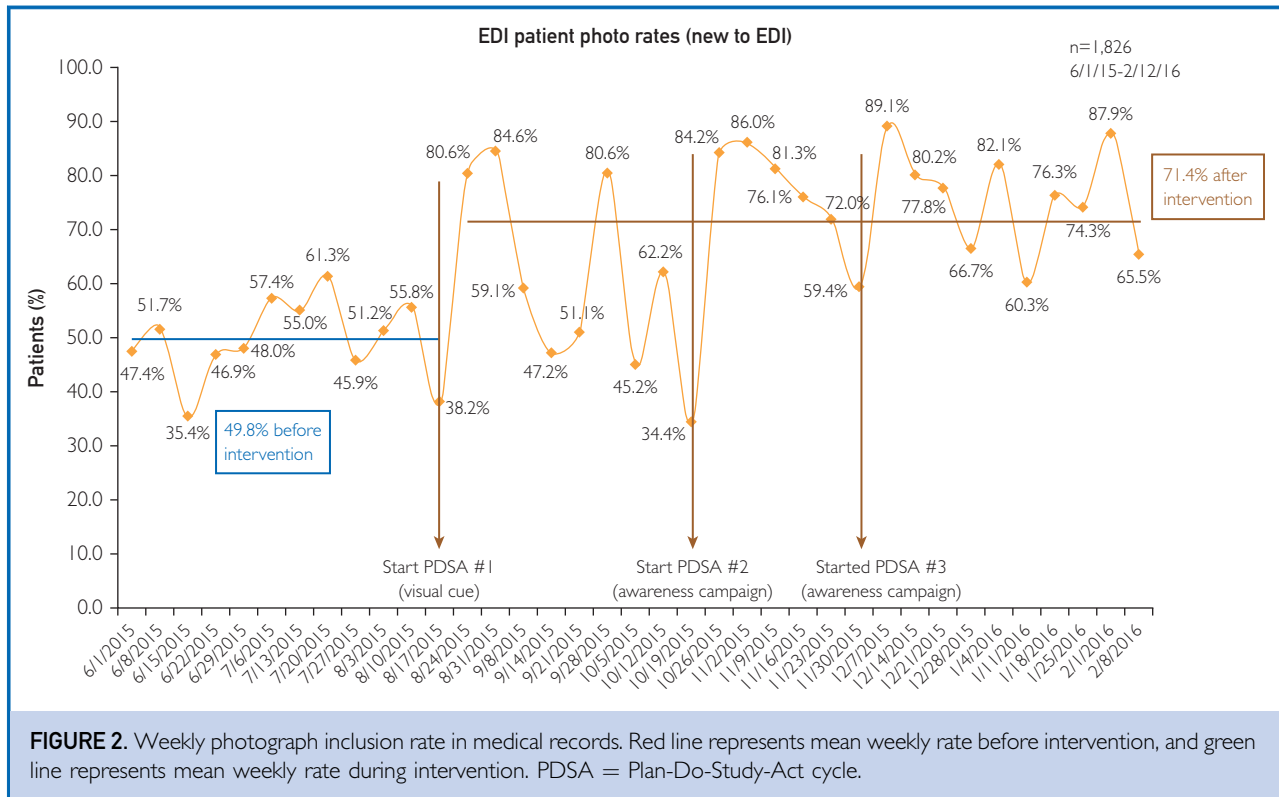Plan-Do-Study-Act cycle 3 (Figure 3C) was then implemented for another 10 weeks but

FIGURE 1. Preintervention Research Electronic Data Capture survey.

FIGURE 2. Weekly photograph inclusion rate in medical records. Red line represents mean weekly rate before intervention, and green line represents mean weekly rate during intervention. PDSA = Plan-Do-Study-Act cycle.

did not substantially increase the photograph inclusion rate, which remained relatively static at 76.0% (497 of 654). The quality improvement intervention was deemed complete as both primary goals had been achieved.

After 3 PDSA cycles, the mean weekly rate of patient photographs included in the EMR was 71.4% (Figure 2, red line), which was significantly improved compared to baseline (F test, $P<.001$).

DISCUSSION

The steps taken to implement this change were a combination of the ADKAR (Awareness, Desire, Knowledge, Ability and Reinforcement) model[14] and the PDSA cycles. Using this approach, we were able to increase the rate of photographs included in our EMR from 49.8% to 70.0% within 6 months with staff acceptability and cooperation and without encountering any barriers.

Our project team was made *aware* of the need for change. We formed a project team of those who also felt the *desire* to participate and support this change. The key stakeholders with *knowledge* on how to implement this change were identified and engaged. The same stakeholders had through previous experiences and work history been demonstrated to possess the *ability* to implement the required skills and behavior and *reinforce* the sustainability of this change. This approach is proven to be an easily implementable intervention that improved patient photograph inclusion in the EMR by more than 20% within 6 months. In our needs assessment preintervention survey, there was an overwhelming desire for patient photograph inclusion in the EMR by physicians working in general internal medicine (92.3%). With the current rate of included photographs of 49.8%, the project team selected a reasonable achievable goal of increasing the rate by 20% of patient photograph inclusion, while considering patient concerns for privacy and time and technical limitations. We assessed the project by running weekly log reports and used the binary variables of "photograph included" vs "photograph not included" for assessment. We also ran 3 PDSA cycles during this

monitoring phase through which we kept improving our steps in an effort to improve/increase acceptability of photograph inclusion in the EMR by the patients. During this time, no other interventions were ongoing in the practice, so we can assume that any change in photograph inclusion percentage was directly attributable to our intervention.

We postulate that at any time, around 10% of patients would refuse to have a photograph included in their EMR for a variety of reasons that may include privacy concerns. This number may have been elevated in our executive medicine clinic, where many of our patients seek to maintain a low profile. When the intervention ended, the team met with the clinical assistants again to ensure that there were no unintended consequences and that workflow was not notably impacted.

We were vigilant for but did not detect any unintended consequences, considering patient flow, staff and patient satisfaction, and any privacy concerns. The front desk clinical assistants did not report any major interruption of workflow. In fact, clinical assistants reported that having a patient photograph allowed them to more easily identify the patient in the waiting area, potentially improving patient experience. However, these data were not collected via an objective study instrument nor were patient privacy concerns. Collecting these data using an objective study instrument would have allowed for more robust conclusions on the occurrences of unintended consequences. The patient lounge was already equipped with computer cameras, so no additional cost was incurred.

One possible limitation of our project is that it was carried out within the Executive Health Program, which has a higher staff to patient ratio than other divisions as well as patient access to a lounge where the photographs were taken. These factors may limit generalizability of our findings to other clinical settings. Although we acknowledge the risk of privacy violations, these should be prevented if standard precautions for protecting patient records are followed. In addition, patients' photographs would need to be updated to account for aging and changes due to illness. We propose yearly updating of patient photographs.

Although our project did not measure cost savings, there are considerable potential cost

FIGURE 3. Plan-Do-Study-Act (PDSA) cycles. QI = quality improvement.
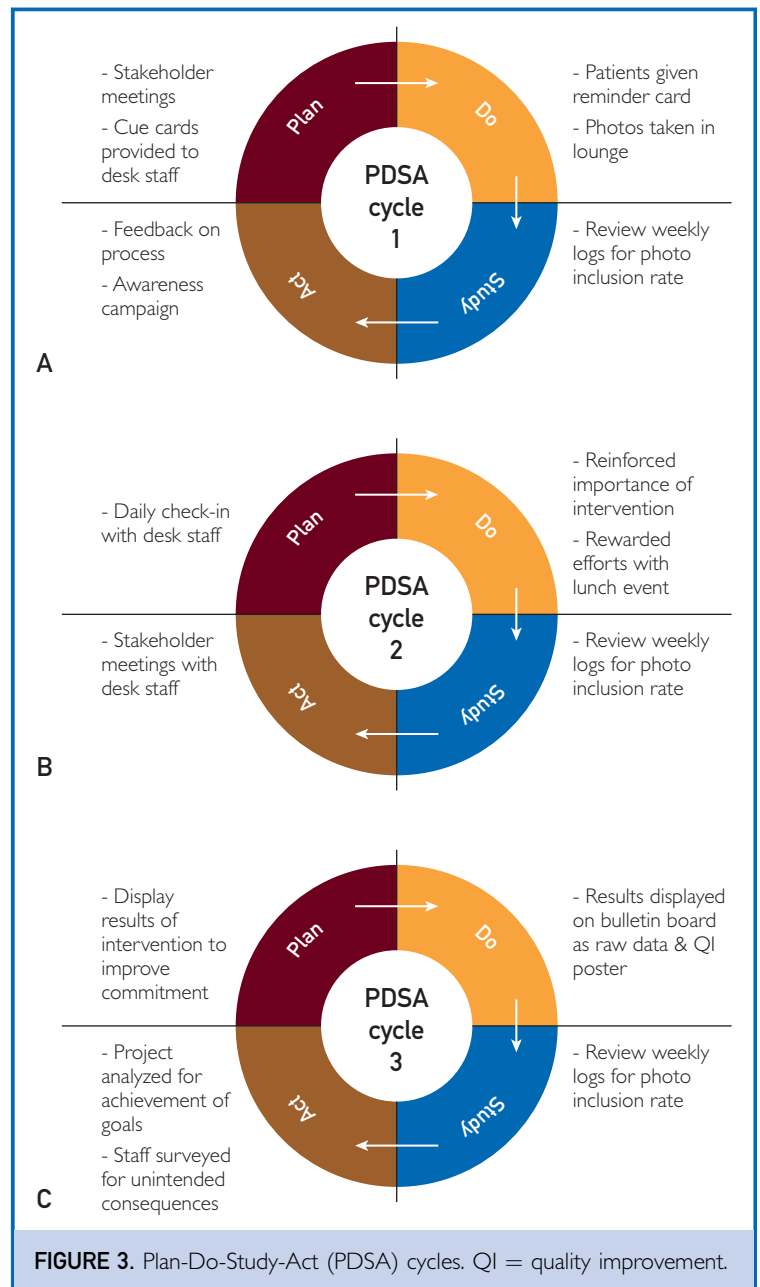
savings in terms of reduction of medical errors and time saved by improving patient recall. Given the ease of implementation, the overall cost-benefit ratio of this intervention is favorable. With frequent assessments and reminders of the importance of including a patient photograph in the medical record, there is potential for this intervention to be sustainable. Although previous studies have

reported drastic reduction in errors of placing orders in unintended charts,[3] we did not evaluate the impact of increased incorporation of patient photographs in the EMR on electronic order errors. Studying electronic order errors is challenging because studies depend on unreliable self-reporting methods. Furthermore, these methods often do not capture near-misses that may be impacted the most by having a photograph in the EMR. Future studies could evaluate the impact of incorporating a photograph in the EMR on electronic order errors using a multidisciplinary approach including physician self-reporting and nursing and pharmacy reporting of physician order errors. This process was beyond the scope of our current project.

CONCLUSION

Overall, this intervention was easily implemented without substantial resources or training required. We incorporated taking the photograph as part of patient intake, which streamlined the process without disrupting patient flow. The project also provided a team-building opportunity in which the clinical and clerical staff felt involved and appreciated as part of the quality improvement efforts.

ACKNOWLEDGMENTS

We extend our sincere thanks to Denise Whalen, Elaine Sorenson, and Amy J. Clark, without whom this project would not have been possible.

REFERENCES

1. Yamamoto LG. Reducing emergency department charting and ordering errors with a room number watermark on the electronic medical record display. *Hawaii J Med Public Health*. 2014;73(10):322-328.
2. Zahabi M, Kaber DB, Swangnetr M. Usability and safety in electronic medical records interface design: a review of recent literature and guideline formulation. *Hum Factors*. 2015;57(5):805-834.
3. Hyman D, Laire M, Redmond D, Kaplan DW. The use of patient pictures and verification screens to reduce computerized provider order entry errors. *Pediatrics*. 2012;130(1):e211-e219.
4. Henneman PL, Fisher DL, Henneman EA, et al. Providers do not verify patient identity during computer order entry. *Acad Emerg Med*. 2008;15(7):641-648.
5. Wilcox AB, Chen YH, Hripcsak G. Minimizing electronic health record patient-note mismatches. *J Am Med Inform Assoc*. 2011; 18(4):511-514.
6. Mannos D. *NCPS patient misidentification study: a summary of root cause analyses. VA NCPS Topics in Patient Safety*. Washington, DC: US Department of Veterans Affairs; June-July 2003.
7. Joint Commission, Joint Commission International, World Health Organization. Patient Identification: patient safety solutions. Vol 1 (Sol 2). World Health Organization website. https://www.who.int/patientsafety/solutions/patientsafety/PS-Solution2.pdf. Published May 2007. Accessed March 13, 2018.
8. Trader J. Why Patient Photos Should Be Linked to Medical Records. Right Patient website. http://www.rightpatient.com/blog/patient-photos-linked-medical-records. Accessed December 12, 2019
9. Lawes S, Grissinger M. Medication errors attributed to health information technology. *Pennsylvania Patient Safety Authority*. 2017;14(1):1-8.
10. ECRI Institute. *Patient Identification Errors*. Plymouth Meeting, PA: ECRI Institute; 2016. Health Technology Assessment Information Service Special Report.
11. Taieb-Maimon M, Plaisant C, Hettinger AZ, Shneiderman B. Increasing recognition of wrong-patient errors through improved interface design of a computerized provider order entry system. *Int J Hum Comput Interact*. 2018;34(5):383-398.
12. Institute for Healthcare Improvement. Model for improvement: Plan-Do-Study-Act (PDSA) cycles. Science of Improvement: Testing Changes. Institute for Healthcare Improvement website. http://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementTestingChanges.aspx. Accessed May 9, 2019.
13. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009; 42(2):377-381.
14. Hiatt JM. *ADKAR: A Model for Change in Business, Government and Our Community*. Loveland, CO: Prosci; 2006.