Expedient Emergency Room Referral Pathway Improves Patient Access to Otolaryngology Care

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Objective: Historically at a multi-hospital residency program, there was an unexpected number of non-urgent consults from the county hospital emergency room (ER) that caused residents to make more trips between hospitals and come closer to violating duty hours. Moreover, there was also a poor follow-up rate for these patients. An alternate pathway to redirect such consults to the Otorhinolaryngology–Head and Neck Surgery (ORL-HNS) clinic, staffed by an attending physician, was devised. This study illustrates how an undemanding process change can improve access to care, and resident duty hours and satisfaction.

Study Design: Quality Improvement Study

Methods: The average rate of no-show appointments and overall number of patients referred from the county hospital ER; a survey of impact on resident workload; and an average number of on-call resident trips to county hospital were compared in the 12 months before and after implementation of an expedited ER referral pathway.

Results: The overall number of patients referred to clinic from ER increased by 35% (123 to 166 patients). The average number of completed visits for patients referred to the ORL-HNS clinic from the ER increased by 29% (91 to 117 patients). There was no statistically significant change in the no-show rate of said patients. The average number of overnight resident trips to the county hospital, frequency of resident unpreparedness for routine clinical duty and need to alter schedule to avoid duty hour violations all decreased, while resident satisfaction increased.

Conclusions: An undemanding process change in a safety-net, publicly-funded, county hospital setting can decrease resident workload and improve satisfaction while possibly improving patient access to specialty clinic care and follow-up rates for patients.

Key Words: emergency room, otolaryngology, referral, Six Sigma, duty hours, resident satisfaction.

Level of Evidence: clinical outcomes, level IV

INTRODUCTION

Our Academic Otolaryngology–Head and Neck Surgery Department is tasked with providing high-quality care at a variety of locations and tasked with training future Otolaryngology–Head and Neck Surgeons. One of our sites of operation is Lyndon B. Johnson (LBJ) General Hospital, a safety-net, publicly-funded, county hospital. It is situated in a severely underserved location in Harris County—approximately 10 miles from the central Texas Medical Center. In fiscal year 2015, this publicly-funded, large health-care organization had to undergo major budgeting retrenchment to continue to provide medical care while keeping expenses practical. In an attempt to reduce a large budget deficit, certain cost containment strategies including up-front payment for non-urgent emergency room (ER) care were enacted. As otolaryngology care was only available by referral from a primary care physician (PCP) or after being seen in the ER by an otolaryngology resident, patients without a PCP or who were not able to wait for an appointment with one would end up in the ER waiting room. Per discussion with our ER colleagues, these patients would wait for long periods of time to be seen or leave without being seen. Our resident physicians were typically called to see the patient, which entails at least a 20-minute drive each way between hospitals. Most of the time, the condition required an outpatient workup and close follow-up; however, these patients were often lost to follow-up.

Since there were obvious processes that could be improved, we decided to utilize modifications of Lean and Six Sigma methodology to enhance the throughput of otolaryngology patients from the ER to our outpatient clinic in an expeditious fashion. Lean, championed by Toyota in the 1970s, focuses on improving efficiency by removing processes which do not add value. Six Sigma, implemented by Motorola in the 1980s, seeks to...
to identify and remove processes which cause defects and variability.\textsuperscript{2} Used now in many industries, the rise of Lean Six Sigma in healthcare was quantified in a recent review, which found a total of 149 publications from 1999 to 2015 in which Lean and Six Sigma techniques were used in an acute care setting.\textsuperscript{3}

Our study’s objective was to utilize these methodologies to facilitate patient access to otolaryngology care while simultaneously relieving an unnecessary burden on resident physicians and improving their satisfaction with overnight call. First, all stakeholders that could potentially be affected by a process change were identified. The problem was acknowledged and a process improvement plan was proposed, which consisted of implementing a new streamlined pathway for ER referrals. After implementation of the pathway, the change in overall number of consults from the ER, patient no-show rate, and resident satisfaction were all analyzed. At the beginning of each academic year, the pathway is revised according to input from stakeholders.

### MATERIALS AND METHODS

Institutional review board (IRB) approval was sought, but an exemption was granted given the quality-improvement nature of this project. Due to the poor rate of follow-up from patients presenting to the ER with non-urgent otolaryngology issues for evaluation by resident physicians, a plan was developed to streamline the process of gaining timely access otolaryngology clinic.

#### Identifying the Problem

We focused on the Define, Measure, Analyze, Improve, Control (DMAIC) improvement cycle, which is a core tool used to drive six sigma projects.\textsuperscript{4} First, we defined the following problems:

1. Patients should not be using the ER for non-urgent complaints
2. Patients in the ER with non-urgent otolaryngology conditions should have appropriate and expedited access to the otolaryngology clinic
3. Residents have restricted duty hours and their time should be used for the most educational opportunities.

Next, we measured the number of patients who were referred from the ER to otolaryngology clinic and their respective no-show rate and determined the stakeholders in this process. Together, all the stakeholders analyzed the issues with the current process for how patients in the ER gained access to otolaryngology clinic.

A list of conditions commonly encountered in the ER was compiled through a questionnaire completed by the Otolaryngology–Head and Neck Surgery house staff (Fig. 1). This list was then presented to the mid-level providers who manage the ER intake area and presented to the nursing staff in the otolaryngology clinic. Once these stakeholders agreed, a re-direction algorithm was designed (Fig. 2).

#### Process Change

Previously, all otolaryngology consults were seen in the ER by an otolaryngology resident regardless of the time or day. Under the new pathway, patients who present to LBJ-ER are first seen in intake to determine whether an emergent medical condition exists. If this exists, then the patient is triaged for...
emergency medical care, seen by ER staff, and the otolaryngology resident is then consulted for evaluation in the ER. If the patient does not have an emergent medical condition and meets one of the listed non-urgent otolaryngology conditions (Fig. 1), they are redirected to the LBJ otolaryngology clinic by one of two processes: between the hours of 8 AM and 5 PM on weekdays, the ER provider at intake contacts the otolaryngology nursing staff rather than the otolaryngology resident and if there is an acute chief complaint, then the patient is transported to the clinic. If the nature of the patient’s complaint is deemed to be more chronic and only require further otolaryngology evaluation but not acute treatment, then a next-available clinic appointment is scheduled. This is usually completed within a few days to a week. If nursing staff is unable to make this determination, then the otolaryngology resident or attending is involved in the decision-making process. Between the hours of 5 PM and 8 AM during the week and during the entire weekends, the ER provider contacts the on-call PGY-2 or PGY-3 resident, who then makes the same determination about acuity of patient condition after confirming with the upper level resident on call. These patients are either scheduled for follow up the following business day at 8 AM or at a next-available clinic appointment.

Second, the above process is possible only because the clinic template was redesigned to allow nursing staff to create new ER-follow up appointment slots without MD approval and more of these slots were made available on any given day in exchange for less new and return patient visit slots.

The otolaryngology clinic served as its own control due to the inability to find a comparable clinic able to effect the same changes. Analysis was performed before and after implementation of ER referral pathway. The total number of patients referred to the otolaryngology clinic from the ER each month and their rate of completing follow up appointments was then extrapolated for the full calendar year before and after implementation of the changes to the referral pathway.

**Survey**

An anonymous 10-question survey of residents involved in the home call process before and after the intervention was collected. Residents were asked to speculate the average number of overnight consults they received from the LBJ-ER each week, the average number of overnight trips they had to take to the LBJ-ER per week, the number of times per month they felt unprepared for clinical duty due to seeing excessive consults overnight or had to change their daily schedule to avoid a duty hour violation.

Statistical analysis was performed with STATA 14 (College Station, TX).

**RESULTS**

**ER Patient Follow Up**

Our study showed a 29% increase (91 to 117 patients) in number of completed ER referral visits to otolaryngology clinic in the year following implementation of the ER referral pathway as well as a 35% increase (123 to 166) in the number of patients scheduled for this visit type (Fig. 3). During this same time, there was a 5.4% decrease in annual ER visits in this hospital system (182,099 to 172,345).

On subgroup analysis of the annum data into the 6 months prior and post-intervention (which corresponded to an academic year: July 2015 to June 2016), the no-show rate for the ER follow-up visit type was 29% for July through December 2015 and 12.7% for January through June 2016 (Fig. 4). Using a two-sample test of proportions, the decrease in average no-show rate for the first 6 months after intervention was 16.3% ($p < 0.02$). However, there was an increase in the no-show rate in the second half of 2016 (39.8% vs. 16.3%, $p = 0.002$). This variation was not seen when comparing early to late 2015 (22% vs. 29%, $p = 0.39$) The average no-show rate comparing the 12 months before and after start of pathway (2015 vs. 2016) increased by 3.5% ($p = 0.51$).
Resident Experience

Resident survey was sent out to all seven residents who experienced primary home call at any point both before and after January 1, 2016 (100% response rate). Results showed that 57% of residents had 3–4 consults per week from the LBJ-ER before intervention and 43% had 3–4 consults per week after (Fig. 5). Seventy-one percent of residents had to present to the LBJ-ER 3–4 times per week to see consults before intervention, and 71% had to present 1–2 times per week after (Fig. 6). Fifty-seven percent of residents felt unprepared for clinical duty after seeing consults at LBJ overnight at least 1–2 times per month before and only 14% felt unprepared at any time after (Fig. 7). Fifty-seven percent of residents had to make an active effort to avoid duty hour violations before and only 14% had to do so after (Fig. 8).

DISCUSSION

Using Lean Six Sigma principles to enact a change in the ER referral pathway to otolaryngology clinic led to an overall increase in the number of patients referred to the clinic and the number of completed ER follow-up visits in the calendar year following implementation of the new pathway. This increase cannot be solely attributed to an increased number of patients visiting the ER, as there was a 5.4% decrease in total ER visits from 2015 to 2016 within this hospital system.\(^5\,\^6\)

Although our intervention was associated with a drastic reduction in no-show rates in the first half of 2016, the rates increased to higher than pre-intervention levels in the second half of 2016. The scheduled volume was higher in the second half of the year following implementation of pathway compared to the first, but no-show rates also trend to higher numbers with a spike in July and December (Fig. 3). There is not a clear reason as to why these two months had such high no-show rates, but we speculate that during July, there may have been difficulty for new staff and residents to learn the pathway as July marks the beginning of the academic year. Similarly, the winter conditions and holidays in December may be a time where many patients may find access difficult due to clinic closures, although in 2015 the no-show rate for December was lower than the annual average (7% vs. 26%). This may represent month-to-month variability in no-show rates. At any given month, the number of ER scheduled follow-ups is less than 21 total (range of 8–21 in 2016 and 4–17 in 2015). These small numbers mean that even a small number of patients that fail to show up to their appointment can greatly impact the no-show rate. A bigger study across multiple hospital sites and subspecialties is required. Furthermore, the authors cannot know the degree of compliance to this referral pathway from the numerous healthcare providers involved. Arranging follow-up is time-consuming for both healthcare provider...
and patients involving coordination and transportation issues. It may be that over time, the compliance dropped.

In a survey of otolaryngology residents, there was not a noticeable change in overall number of consults from the LBJ-ER; however, there was a decrease in the need to see consults overnight. After implementation of new ER referral pathway, residents felt more prepared for routine clinical duty, less frequently had to alter their daily schedule to avoid duty hour violations, and were overall more satisfied with taking home call. As there was no system in place for recording total number of consults or overnight trips between hospitals, we had to rely on resident memory, introducing a significant concern for recall bias. The opportunity for a decreased resident work load and increased satisfaction is inherent in the new pathway given that the residents are now able to redirect potential overnight consults to the clinic, rendering the results of the survey less useful.

The National Center for Health Statistics reported a 26% increase in total number of ER visits to nearly 114 million between 1993 and 2003 despite a 12% decrease in the number of ERs. This number continues to climb, with more than 130 million ER visits in 2013. A recent review of studies comparing urgent to non-urgent ER visits showed an average of 37% non-urgent visits. With a steadily increasing number of non-urgent visits to the EC comes the potential for a greater burden on the system. The ERs can be overwhelmed with less severe conditions, diverting physicians’ attention from more severe and urgent issues. In training centers, this burden can be passed on to residents and fellows, which can lead to duty hour violations.

Although many otolaryngologic concerns can be adequately assessed and managed or referred for further evaluation by primary care providers, a recent database review shows that adult and pediatric patients presenting with otologic complaints represent a large ER care burden. Another review showed that patients with poor access to healthcare may be more likely to present to the ER with non-urgent complaints such as uncomplicated acute rhinosinusitis.

Despite the obvious correlations between uninsured patients and non-urgent ER visits, even patients who do have access to primary care providers may still present to the ER for non-urgent issues. One study of a nationally representative patient sample found that perceived quality of primary care played a larger role in patient decision for non-urgent ER use than did access to ambulatory care. In another study, two-thirds of patients who presented for a non-urgent emergency visit had a regular source of ambulatory care. While our study does not address the larger problem of why patients choose the ER over their primary care provider for non-urgent issues, streamlining access to specialty clinic care should theoretically decrease the number of non-urgent emergency visits for similar issues and lead to less wait time for patients by decreasing the ER patient burden. This pilot project should also improve access to otolaryngology care for those patients seeking this care via the ER.

Further longitudinal studies are warranted to determine long-term impact of the ER referral pathway. At the beginning of each academic year, the pathway will be reviewed with all the stakeholders and further improvements will be made. A more qualitative approach may determine why the improvements did not remain consistent.

CONCLUSION

An undemanding process change in a safety-net, publicly-funded, county hospital setting can decrease resident workload and improve satisfaction while possibly improving patient access to specialty clinic care and follow-up rates for patients.

BIBLIOGRAPHY

1. Ohno, T. Toyota Production System: Beyond Large-Scale Production. 1st ed. 1988, Portland, OR: Productivity Press.
2. Pande PS, Neuman, RP, Cavanagh RR, The Six Sigma Way: How GE, Motorola, and Other Top Companies are Honing Their Performance. 2000, New York, NY: McGraw-Hill.
3. Deblous S, Lepanto L. Lean and Six Sigma in acute care: a systematic review of reviews. Int J Health Care Qual Assur 2016;29:195-208.
4. Almorsy L, Khalifa M. Lean Six Sigma in health care: improving utilization and reducing waste. Stud Health Technol Inform 2016;226:194-197.
5. Harris Health System. Harris Health Annual Report 2016. Available at: https://www.harrishealth.org/SiteCollectionDocuments/annual-reports/annual-report-2016.pdf. Accessed 10 March 2017.
6. “Harris Health Annual Report 2015.” Harris Health System. <https://www.harrishealth.org/SiteCollectionDocuments/annual-reports/harris-healthannual-report-2015.pdf> Accessed 10 March 2017.
7. Rui P, Kang K, Albert M. National Hospital Ambulatory Medical Care Survey: 2013 Emergency Department Summary Tables. Available from: http://www.cdc.gov/nchs/data/ahcd/nhamcs_emergency/2013_ed_web_tables.pdf.
8. Uscher-Pines L, Pines J, Kellermann A, Gillen K, Mehrotra A. Emergency department visits for non-urgent conditions: A systematic review of the literature. Am J Manag Care 2013;19:47-59.
9. Kozin ED, Sethi RK, Remschneider AK. Epidemiology of otologic diagnoses in United States emergency departments. Laryngoscope 2015;125(8):1926–1933.
10. Scangas GA, Ishman SL, Bergmark RW, Cunningham MJ, Sedaghat AR, Emergency department presentation for uncomplicated acute rhinosinusitis is associated with poor access to healthcare. Laryngoscope 2015;125(8):1926–1933.
11. Xin H, Kilgore ML, Sen BP, Blackburn J. Can Nonurgent Emergency Department Care Costs be Reduced? Empirical Evidence from a U.S. Nationally Representative Sample. J Emerg Med 2015;49(3):347–354.
12. Cunningham P, May J. Insured americans drive surge in emergency department visits, in Issue Brief: Findings from the HSC. Washington, DC: Center for Studying Health System Change; 2003.