Standardization of Discharge Teaching for Children with Traumatic Brain Injury

Erin A. Gizzi, BSN, RN

Oregon Health & Science University School of Nursing

Submitted to: Dr. Rana Najjar, PhD, RN, CPNP

This paper is submitted in partial fulfillment of the requirements for the Doctor of Nursing Practice degree.

Abstract

Background: Studies have shown the use of dot phrases in the electronic health record can improve patient education and patient/family engagement. Creating and utilizing dot phrases allows for standardization of information while the use of smart lists embedded within a dot phrase allows for individualization based on patient need.

Local Problem: Traditional discharge summaries currently being utilized are not individualized. The goal of this project was to develop and implement discharge teaching for children with traumatic brain injury (TBI) by providing updated and individualized discharge summaries based on the level of severity of the injury and patient-specific follow-up plans.

Methods: The previous electronic health record (EHR) dot phrase used for discharge teaching for children with TBI was reviewed and updated, including the addition of smart lists. Education on the use of the dot phrase was delivered to medical providers and the utilizations of the dot phrase was tracked.

Results: 100% (n=9) of discharge summaries completed by pediatric trauma nurse practitioners and physician assistants contained the new dot phrase and were appropriately individualized using the embedded smart lists. Pediatric trauma medical residents used the dot phrase 25% of the time, while other pediatric medical teams never used the new dot phrase.

Conclusion: Discharge summaries can easily and reliably be revised to individualize discharge information based on patient need. The result on usage of the dot phrase supports the need for the expansion of education efforts to medical residents and other pediatric medical teams.

Keywords: traumatic brain injury, discharge education, dot phrase

Introduction

Problem Description

Unintentional injuries are the leading cause of death in children, with traumatic brain injury (TBI) contributing to lasting neurologic effects and over 40% of unintentional injury related deaths (Centers for Disease Control and Prevention, 2022). TBIs range in severity from mild, often called a concussion, to severe or even fatal (Mayo Clinic, 2021). A person with a TBI may experience physical complications, communication problems, and cognitive issues (Cnossen et al., 2018). In moderate to severe cases, these symptoms may be long-term or even permanent. There is also an increased risk of greater disability for longer periods of time with recurrent TBIs (Centers for Disease Control and Prevention, 2015). These effects are especially prominent if recurrence occurs in the acute phase of TBI recovery. The recurrence incidence rate in children is estimated at 5.2 per 100 person-years (Lasry et al., 2021). Hsia et al. (2020) also found that 8.8% of TBI readmissions occurred after an initial visit, with 70.8% of those having one readmission within the year and 7.8% having more than four admissions within the year. These admissions can cost up to an average of $70,000 per case for severe TBIs (Howard et al., 2018). Because of the risk for long-term disabilities caused by TBI and increased strain on hospital systems resulting from readmissions, it is imperative that children and families understand the risks and receive individualized guidance on how best to prevent future injury and hospital readmission.

High quality discharge care is an important factor in reducing recurrence of TBIs and hospital readmissions. Traditional discharge teaching often consists of structured teaching and generic information that may be difficult to understand. This has been shown to be less effective in meeting the comprehensive needs of a family following hospital admission for TBI (Abdul Rahman et al., 2020; Weiss et al., 2017). Instead, Weiss, et al. (2017) found that teaching should be based on an interdisciplinary approach that is family-centered and individualized to the situation. In doing so, families may feel more empowered to recognize serious sequelae of TBI and prevent future TBIs.

Available Knowledge

There are known problems associated with recurrent TBIs. For one, there is an increased risk of long-term impairment such as learning difficulties, sleep disorders, and increased vulnerability to neurodegenerative disorders (Bramlett & Dietrich, 2015; Centers for Disease Control and Prevention, 2015). These known problems also lead to missed school and work, which can be detrimental to a child's academic growth, and overall, negatively affect quality of life. Additionally, TBIs contribute to an enormous strain on the hospital system. Using data from the Healthcare Cost and Utilization Project, Reid and Fingar (2020) found that a single hospitalization for TBI is costlier and longer than non-TBI related inpatient hospitalizations ($21,000 vs $12,000; and 6.8 days vs 4.6 days). Howard et al. (2018) found that TBIs classified as severe cost an average of $70,000 per case. In order to prevent recurrent TBIs and readmissions, and therefore, reduce long-term problems and high healthcare costs, it is important that patients and families receive comprehensive discharge instructions.

A traditional model of discharge teaching, one that provides only general information, is inferior to discharge teaching that is tailored to individual and family needs. Research shows that the most effective method for discharge teaching is patient-centered, and begins on admission. The content of discharge teaching and the methods used to deliver this information should always be evidence-based (Braet et al., 2016; Luther et al., 2019; Weiss et al., 2017). This ensures that patients are receiving the most up-to-date information regarding their diagnosis and disease process in a way that is understandable.

Studies have shown the use of dot phrases in the electronic health record (EHR) can improve patient education and patient/family engagement (Chavez et al., 2022; Dufault et al., 2021). Creating and utilizing dot phrases allows for standardization of information while the use of smart lists embedded within a dot phrase allows for individualization of the information. Dufault et al. (2021) found that dot phrase usage improved patient satisfaction and perceived patient safety and security. Similarly, Chavez

et al. (2022) found that embedding smart lists into these EHR templates significantly improved patient education and follow-up plans. By utilizing these EHR tools in discharge instructions, patients may receive evidence-based information and resources, in addition to personalized follow-up care instructions.

It has been found that provider involvement in quality improvement projects is increased when collaborative methods are employed (Balbale et al., 2016). Additionally, intrinsic drive is a highly motivating factor for participation in such projects and should be considered with initial interest in the project (Berenson & Rice, 2015; Jones et al., 2019). By creating a collaborative environment, providers who have the desire to improve TBI discharge instructions may have the opportunity to contribute to the materials that are provided to their patients.

Discharge instructions for TBI should be based on the severity of the injury, and include information on expected and unexpected symptoms and return to activity. The information should be readable and follow standardized evidence-based guidelines with the addition of individualized plans of care in order to empower patients and families to make informed choices and maintain self-care post-discharge. One way to provide this information in a systematic, yet customizable way is through the use of dot phrases and smart lists embedded into the EHR, which is developed in a collaborative manner with those who have personal interest and motivation for such improvement.

Rationale

This project followed the IHI Model for Improvement (MFI). This model is widely used in healthcare and has been shown to lead to significant improvement (Christoff, 2018; Taylor et al., 2014). The MFI utilizes Plan-Do-Study-Act (PDSA) cycles to quickly assess for change and improvement. Following these cycles allows for rapid evaluation of small changes that can be tailored with each cycle to yield improvement. This MFI supported our success in reaching our specific aim because it was easy to use and evidence-based.

During the root cause analysis and creation of a cause-and-effect diagram, it was clear that there was inadequate discharge teaching for children with TBI. A thorough review of the literature provided evidence that effective discharge requires information to be individualized to patient and family needs and according to the level of TBI severity. The information must also be up to date to ensure that it is consistent with best practice guidelines. One way this was achieved was through the use of dot phrases and smart lists within the EHR. This new teaching ensured that families received the information they needed to care for their child with TBI. The MFI supported our success in reaching our specific aim because it facilitated rapid cycles of change and was evidence-based.

Specific Aims

The goal of this project was to develop and implement discharge teaching for children age 0-18 years with TBI by providing updated and individualized discharge summaries based on the level of severity of the injury, in the form on an EHR dot phrase. During the development of the dot phrase, approval by participating providers of at least a 4.5/5 on the Readiness Survey was needed prior to dissemination of the dot phrase. By October 1st, 2022, 95% of surveyed providers should have knowledge of the dot phrase and should be either “somewhat likely” or “very likely” to use the dot phrase for future discharges, as indicated by the Knowledge Survey. By December 20, 2022 85% of children discharged from the hospital with a diagnosis of TBI should have discharge summaries that include the updated dot phrases in the after-visit summary (AVS).

Methods

Context

Children admitted to a children’s hospital, in a metropolitan city in the Pacific Northwest, for TBI were followed by various interprofessional teams. Daily cares and education were provided by floor nurses while medical treatment was managed by the pediatric neurology, neurosurgery, trauma, or critical care team. Each pediatric team included medical doctors and advanced practice providers (APPs),

such as nurse practitioners and physician's assistants. Discharges were primarily managed by APPs on the pediatric trauma team. Prior to this project, discharge teaching provided to children with TBI was generalized without modifications based on TBI severity. Additionally, some of the information in the teaching was not aligned with the current TBI management guidelines.

Some of the foreseen barriers to this project included low utilization of the dot phrases due to comfort with previous practice, as it often takes time to alter well-established habits to reflect new information. However, there was a general understanding among individuals representing each team that the previous discharge teaching was inadequate. It was clear that team members were eager to revamp the discharge teaching to improve patient and family knowledge.

Interventions

The previous Epic dot phrase used for discharge teaching for children with TBI was reviewed and updated. Updates included the most current discharge education for TBI, per evidence-based guidelines and separate discharge dot phrases based on severity of TBI (mild to moderate and moderate to severe). Smart lists were included to provide opportunities to individualize the discharge teaching (See Figure C1). Multiple iterations of the dot phrase were provided to ensure that the dot phrase served as a usable tool for each team. The final dot phrase was presented to a team of pediatric providers whose work included discharging patients diagnosed with TBI. These providers were representatives of various medical teams including pediatric critical care, trauma, neurology, and neurosurgery. Education on the use of the dot phrase was provided via email and live presentations. The dot phrase was then launched for use in the EHR as part of the patient discharge summaries.

The use of the dot phrase was tracked via chart review based on hospitalization diagnosis code (ICD-10 code: S06) and the presence of the dot phrase in the completed after visit summary (AVS) for three months following the launch. Data was presented to providers and additional education was provided for dot phrase usage under 85%.

Study of the Interventions

During the creation phase of the dot phrase, written and verbal feedback was obtained and utilized to make changes to the dot phrase. All iterations of the dot phrase were kept for records, with particular attention to patterns of feedback. Once this phase was completed, we knew the intervention was working because providers were aware of the dot phrase and felt confident using the dot phrase, as indicated by the Knowledge Survey. In addition to the survey data, discussions with providers regarding the use of the dot phrase helped to identify potential gaps in competence and knowledge. This information also helped to identify unforeseen barriers which guided subsequent changes related to education about the dot phrase.

Measures

The process measures included provider approval of the dot phrase, provider awareness of the dot phrase and likelihood of using the dot phrase in the AVS. Providers were asked to rate the content of the dot phrase on a scale of one to five (one being not ready for use at all, five being definitely ready for use) with every iteration of the dot phrase (See Appendix A). Once there was an average of 4.5/5 on the Readiness Survey, the dot phrase was considered ready for launch. After providing education, a three-question Knowledge Survey was administered to assess provider knowledge and confidence in using the dot phrase (See Appendix B). The outcome measure for this project was the percentage of discharge summaries that contained the new dot phrase in the three months following the launch.

Analysis

Data analysis included the means of the numeric scales for the Readiness and Knowledge Surveys. The presence of the dot phrases in discharge summaries, indicated as “Present” or “Not Present,” for three months following the launch was tracked and analyzed on an Excel spreadsheet, weekly. This included dot phrase use categorized by both medical team and by APPs versus medical

doctors. For discharge summaries containing the dot phrase, data was collected on the individualization of the dot phrase based on both patient severity and follow-up needs.

Ethical Considerations

All providers within the pediatric neurology, neurosurgery, trauma, or critical care teams were informed of the project by email. Representatives from each team had the opportunity to contribute commentary and edits to the dot phrase to ensure that the information was adequate and incorporated individual needs of the teams. Education was available to all team members, regardless of participation in the creation phase of the project. All participation in the project was voluntary. There was no potential for violation of any ethical principles, as the chart review and data analysis phase of the project not include documentation of patient identifiers. A request for determination was submitted to the Oregon Health & Science University Institutional Review Board. It was deemed not research, and no further action was taken.

Results

Each iteration of the dot phrase was developed and reviewed by 3-4 out of 9 providers, representative of each medical team. Each iteration incorporated edits and suggestions from the previous draft. After three iterations, the dot phrase was approved with a readiness score of greater than 4.5/5 by August 31, 2022, meeting the first aim of this project**.** The dot phrase was then transferred to the EHR where smart lists were embedded in order for providers to easily select the TBI severity and customize follow-up care based on individual patient needs. The dot phrase was then submitted to the organization's Information Technology Group (ITG) to be released for public use throughout the hospital. In anticipation of this process taking time, the dot phrase was privately distributed to the trauma team APPs, who are permanent team members. Dot phrase education was provided to five APPs virtually on September 20, 2022. After the education session, two out of the five trauma APPs responded to an email that contained the Knowledge Survey. To encourage additional responses, a

Qualtrics survey was created containing the Knowledge Survey and the link was sent to all the APPs, providing two additional survey responses. It was difficult to ascertain whether the responses to the Qualtrics survey were the same ones who responded to the email containing the Knowledge Survey. All four responses (100%) reported awareness of the dot phrase and high likelihood of using the dot phrase, meeting the second aim. After ITG's approval, the dot phrase became public on October 13, 2022, which was followed by email education for the critical care, neurology, and neurosurgery teams that included images with stepwise instructions and a PowerPoint presentation. The QR code for the Knowledge Survey was included in the email. There were no responses to education or the Knowledge Survey from this group of providers.

In TBI discharges for the data collection period of September 20, 2022 to December 20, 2022, 100% (n=9) of discharge summaries completed by the trauma APPs contained the new dot phrase and were appropriately individualized using the embedded smart lists (See Figure C2). This met aim three for this subset of providers. There were eight discharges by trauma team medical residents, however, only four occurred after the dot phrase became public. Only one out of the four discharges (25%) contained the new dot phrase. Education was implemented in mid-November to include the dot phrase in new resident orientation. The data collection phase of the project ended prior to the introduction of the dot phrase to new residents, as the residents rotate in 4-week cycles, so the effect of the additional education was not evaluated. Providers from other pediatric teams (neurosurgery and hospital medicine) accounted for 16% of all discharges, none of which contained the dot phrase.

Contextual elements which interacted with the interventions included transient trauma team members (medical residents) and the admission of TBI patients to various medical teams. The medical residents spend a limited amount of time with the trauma team and may or may not discharge TBI patients. They are also from a variety of other residency programs including general (adult) surgery, anesthesia, and otolaryngology. TBI patients were also infrequently followed by the pediatric

neurosurgery or pediatric hospital medicine teams. In additional to insufficient opportunities to practice using the dot phrase, logistical barriers to education dissemination were present, specifically in communication with the neurosurgery team. This resulted in inadequate utilization of the dot phrase in the two discharges by the neurosurgery team which occurred during data collection.

Discussion

Summary

This quality improvement project sought to improve and standardize discharge teaching for children diagnosed with TBI. The goal of collaboratively developing evidence-based, customizable discharge instructions was achieved after multiple iterations with input from a variety of health care team members. Additionally, providers who were most likely to discharge children with TBI (trauma team APPs) exhibited high knowledge and confidence with the use of the dot phrase after receiving education. Education did not initially extend to other trauma team members, including the rotating medical residents. Lastly, usage of the dot phrase was very high for those who exhibited knowledge and confidence with the dot phrase, but was lacking for those who did not respond to the survey (critical care, neurology, and neurosurgery teams) or were not permanent members of the involved medical team (medical residents). This project demonstrated that contextual elements, such as active education for medical residents and other medical teams, had significant impacts on the use of the dot phrase. The strength of this project was the collaboration, development, and use of evidence-based, customizable discharge education to children with TBI and the ability to extend education to those who may care for these children.

Interpretation

The dot phrase was created after multiple iterations, using a collaborative approach which worked to foster provider engagement with the project. This approach was similar to Balbale et. al. (2015) which found that participatory methods can have a positive impact on the success of quality

improvement efforts. The goal was that the process and design of the quality improvement project was strengthened through the use of this collaborative approach. The participation of experienced providers in this project helped to ensure that the developed discharge instructions were user-friendly and contained accurate and useful information.

Our results showed a correlation between provider engagement and the use of the dot phrase. The trauma team APPs expressed interest and participated throughout the development and education phases of the project. This high level of initial engagement correlated with high usage of the dot phrase. On the other hand, lack of engagement with education, coupled with limited opportunities to use the dot phrase, correlated with low usage in our project. Similarly, Ralston et. al. (2017) found that team engagement was a key factor in differentiating successful and unsuccessful quality improvement sites. Unlike our study, which saw rotating residents as a barrier to the usage of the dot phrase, Cheston et. al. (2018) successfully utilized rotating medical residents and students to facilitate their project. Our study had not considered capitalizing on the rotating resident schedule in the design of the project.

Similar studies used only dot phrases to improve patient care (Breeden et al., 2022; Kaushal et al., 2020; Schneiderhan et al., 2021). However, like Neelakantan (2018) who utilized both dot phrases and embedded smart lists, we were able to individualize care plans to be utilized in patient-facing material. Furthermore, our results showed that the use of the dot phrase led to the dissemination of TBI resources to appropriate patients and the individualization of patient education and follow-up care (Chavez et al., 2022). Additionally, our study was an improvement of discharge instructions for TBI since literature indicates that most TBI discharge instructions were vague, based on adult studies, and differed from scientific evidence for signs and symptoms of TBI sequela (Fung et al., 2006). Based on the literature, we focused on discharge instructions that were customizable and evidence-based. With the new dot phrase, patients received information on expected and unexpected symptoms, activity restrictions, and follow-up care instructions which were tailored to their individual needs.

Limitations

Our study had a number of important limitations. The total number of TBI patients during the study period was relatively low. The low number of TBI cases meant that there were few opportunities for providers to practice using the dot phrase, despite education efforts. Additionally, the low number of cases made it difficult to find meaningful statistics in weekly or even monthly data reports. Along this line, the data collection period was relatively short and did not extend long enough to appreciate the effect of the education provided to the trauma team residents. Additionally, we underestimated the amount of time it would take for ITG to approve the dot phrase for public use. However, these effects were minimized by making the dot phrase available to the trauma APPs during this time, knowing that they would be the primary users of the dot phrase. This project is generalizable to any medical team who discharges patients that might benefit from individualized discharge instructions and follow-up plans. However, this intervention may be limited by the capabilities of an institution's EHR.

Conclusions

Through this quality improvement project, we were able to demonstrate the feasibility of revising discharge summaries and utilizing them for patient instruction. It was shown that the use of general information could easily and reliably be individualized using EHR tools such as smart lists embedded in dot phrases. The result on usage of the dot phrase supports the need for the expansion of education efforts to transient team members and to medical teams who perform a minority of TBI discharges. This project is sustainable through the integration of the dot phrase in the trauma APP standards of care and through the onboarding process for new trauma APPs, which relies on current team members for onboarding education. Additional PDSAs would help address the gaps in medical resident education. Data on patient satisfaction and effectiveness of education may be collected in future PDSAs. The success of the dot phrase development and customizability supports the expansion of dot phrase modifications to improve patient-facing materials as areas of future work. It is recommended

that future interventions utilize not only evidence-based materials, but customizable EHR options to individualize patient information and consider rotating resident schedules in project design.

References

Abdul Rahman, N. 'Inayati, Nurumal, M. S., Awang, M. S., & Mohd. Shah, A. N. S. (2020). Emergency department discharge instruction for mild traumatic brain injury: Evaluation on readability, understandability, actionability and content. *Australasian Emergency Care*, *23*(4), 240–246. https://doi.org/10.1016/j.auec.2020.06.005

Balbale, S. N., Locatelli, S. M., & LaVela, S. L. (2016). Through their eyes: Lessons learned using participatory methods in health care quality improvement projects. *Qualitative Health Research*, *26*(10), 1382–1392. https://doi.org/10.1177/1049732315618386

Berenson, R., & Rice, T. (2015). Beyond measurement and reward: Methods of motivating quality improvement and accountability. *Health Services Research*, *50*(S2). https://doi.org/10.1111/1475-6773.12413

Braet, A., Weltens, C., & Sermeus, W. (2016). Effectiveness of discharge interventions from hospital to home on hospital readmissions: A systematic review. *JBI Database of Systematic Reviews and Implementation Reports*, *14*(2), 106–173. https://doi.org/10.11124/jbisrir-2016-2381

Bramlett, H. M., & Dietrich, W. D. (2015). Long-term consequences of traumatic brain injury: Current status of potential mechanisms of injury and neurological outcomes. *Journal of Neurotrauma*, *32*(23), 1834–1848. https://doi.org/10.1089/neu.2014.3352

Breeden, M., Hartley, S., Huey, A., McTaggart, S., & Heidemann, L. A. (2022). Implementation of an electronic health record intervention to improve resident documentation and communication about overnight cross-cover events. *American Journal of Medical Quality*, *37*(4), 371. https://doi.org/10.1097/JMQ.0000000000000058

Centers for Disease Control and Prevention. (2015). *The report to congress on traumatic brain injury in the United States: Epidemiology and rehabilitation*. https://www.cdc.gov/traumaticbraininjury/pdf/TBI_Report_to_Congress_Epi_and_Rehab-a.pdf

Centers for Disease Control and Prevention. (2022). *Surveillance report of traumatic brain injury-related deaths by age group, sex, and mechanism of injury—United States, 2018 and 2019*. 15.

Chavez, C., Rousseau-Pierre, T., Bu, A., Gonzalez, M. P., Kenny, G., Lopez-Pichardo, T., Rivera, A., & Siegel, J. (2022). Improving the delivery of e-cigarette screening and counseling services to adolescents. *Journal of Adolescent Health*, *70*(4), S92–S93. https://doi.org/10.1016/j.jadohealth.2022.01.094

Cheston, C. C., Alarcon, L. N., Martinez, J. F., Hadland, S. E., & Moses, J. M. (2018). Evaluating the feasibility of incorporating in-person interpreters on family-centered rounds: A QI initiative. *Hospital Pediatrics*, *8*(8), 471–478. https://doi.org/10.1542/hpeds.2017-0208

Christoff, P. (2018). Running PDSA cycles. *Current Problems in Pediatric and Adolescent Health Care*, *48*(8), 198–201. https://doi.org/10.1016/j.cppeds.2018.08.006

Cnossen, M. C., van der Naalt, J., Spikman, J. M., Nieboer, D., Yue, J. K., Winkler, E. A., Manley, G. T., von Steinbuechel, N., Polinder, S., Steyerberg, E. W., & Lingsma, H. F. (2018). Prediction of persistent post-concussion symptoms after mild traumatic brain injury. *Journal of Neurotrauma*, *35*(22), 2691–2698. https://doi.org/10.1089/neu.2017.5486

Dufault, M., Dalky, A., Ritz, J., Begnoche, M., Chauvin, M., Cherenzia, K., Corrente, J., Laquale, P., & Machan, J. (2021). Outcomes of integrating smart phrase interface technology to improve cancer symptom management. *Journal of Practical and Professional Nursing*, *5*(1), 1–11. https://doi.org/10.24966/PPN-5681/100024

Fung, M., Willer, B., Moreland, D., & Leddy, J. J. (2006). A proposal for an evidenced-based emergency department discharge form for mild traumatic brain injury. *Brain Injury*, *20*(9), 889–894. https://doi.org/10.1080/02699050600831934

Howard, S. W., Zhang, Z., Buchanan, P., Bernell, S. L., Williams, C., Pearson, L., Huetsch, M., Gill, J., & Pineda, J. A. (2018). The cost of a pediatric neurocritical care program for traumatic brain injury:

A retrospective cohort study. *BMC Health Services Research*, *18*(1), 20. https://doi.org/10.1186/s12913-017-2768-0

Hsia, R. Y., Mannix, R. C., Guo, J., Kornblith, A. E., Lin, F., Sokolove, P. E., & Manley, G. T. (2020). Revisits, readmissions, and outcomes for pediatric traumatic brain injury in California, 2005-2014. *PLOS ONE*, *15*(1). https://doi.org/10.1371/journal.pone.0227981

Jones, B., Vaux, E., & Olsson-Brown, A. (2019). How to get started in quality improvement. *BMJ: British Medical Journal*, *364*. http://www.jstor.org/stable/26956610

Kaushal, T., Lord, K., Olsen, R., Mehta, S., Clark, S., Laskin, B., Traynor, D., Taylor, A., Shaw, K. N., & Srinivasan, V. (2020). Improving disposition decision-making for pediatric diabetic ketoacidosis: A quality improvement study. *Pediatric Quality & Safety*, *5*(2). https://doi.org/10.1097/pq9.0000000000000260

Lasry, O., Dendukuri, N., Marcoux, J., & Buckeridge, D. L. (2021). Recurrent traumatic brain injury surveillance using administrative health data: A bayesian latent class analysis. *Frontiers in Neurology*, *12*. https://www.frontiersin.org/article/10.3389/fneur.2021.664631

Luther, B., Wilson, R. D., Kranz, C., & Krahulec, M. (2019). Discharge processes: What evidence tells us Is most effective. *Orthopaedic Nursing*, *38*(5), 328–333. https://doi.org/10.1097/NOR.0000000000000601

Mayo Clinic. (2021). *Traumatic brain injury—Symptoms and causes*. Mayo Clinic. https://www.mayoclinic.org/diseases-conditions/traumatic-brain-injury/symptoms-causes/syc-20378557

Neelakantan, A. (2018). Improving patient satisfaction by implementing existing tools in EHR using lean methodology. *Neurology*, *90*(15 Supplement). https://n.neurology.org/content/90/15_Supplement/P3.157

Ralston, S. L., Atwood, E. C., Garber, M. D., & Holmes, A. V. (2017). What works to reduce unnecessary care for bronchiolitis? A qualitative analysis of a national collaborative. *Academic Pediatrics*, *17*(2), 198–204. https://doi.org/10.1016/j.acap.2016.07.001

Reid, L. D., & Fingar, K. R. (2020). *Inpatient stays and emergency department visits involving traumatic brain injury, Statistical brief #255*. Agency for Healthcare Research and Quality (US). http://www.ncbi.nlm.nih.gov/books/NBK556732/

Schneiderhan, J., Zick, S., Bhandiwad, A., & Hendriks, E. (2021). Covid coping: The potential of dot phrases to allow for quick uptake of integrative health approaches. *Global Advances in Health and Medicine*, 26. https://doi.org/10.1177/21649561211003689

Taylor, M. J., McNicholas, C., Nicolay, C., Darzi, A., Bell, D., & Reed, J. E. (2014). Systematic review of the application of the plan–do–study–act method to improve quality in healthcare. *BMJ Quality & Safety*, *23*(4), 290–298. https://doi.org/10.1136/bmjqs-2013-001862

Weiss, M. E., Sawin, K. J., Gralton, K., Johnson, N., Klingbeil, C., Lerret, S., Malin, S., Yakusheva, O., & Schiffman, R. (2017). Discharge teaching, readiness for discharge, and post-discharge outcomes in parents of hospitalized children. *Journal of Pediatric Nursing*, *34*, 58–64. https://doi.org/10.1016/j.pedn.2016.12.021

Appendix A

Readiness Survey

Mild-to-Moderate

1	2	3	4	5
Not Ready at All				Definitely Ready

Please provide feedback and suggested changes below:

Moderate-to-Severe

1	2	3	4	5
Not Ready at All				Definitely Ready

Please provide feedback and suggested changes below:

Appendix B

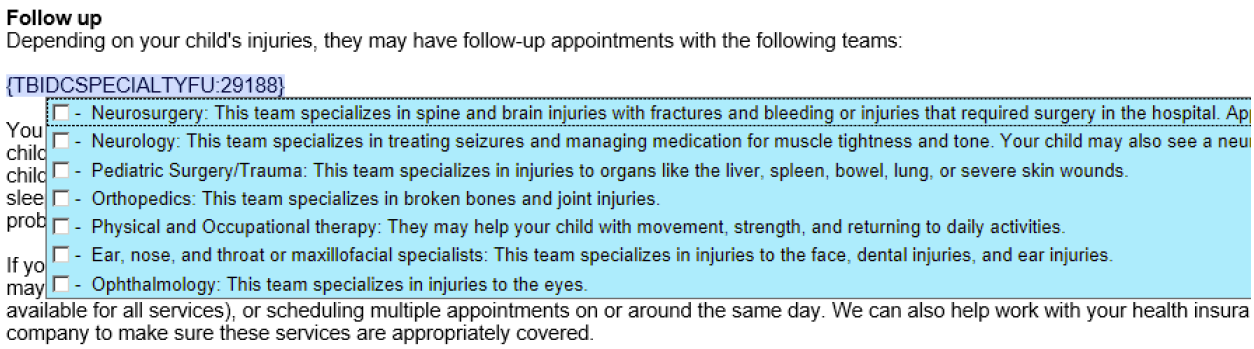
Knowledge Survey

1. Are you aware of the dot phrase **.TBIDCEDU**? (yes/no)
2. Do you know how and when to use the dot phrase **.TBIDCEDU**? (yes/no)
3. How likely is it that you will use this dot phrase with future patients? (very unlikely, somewhat unlikely, neutral, somewhat likely, very likely)
    a. If “very unlikely” or “somewhat unlikely,” please provide reasoning.

Appendix C

Figure C1

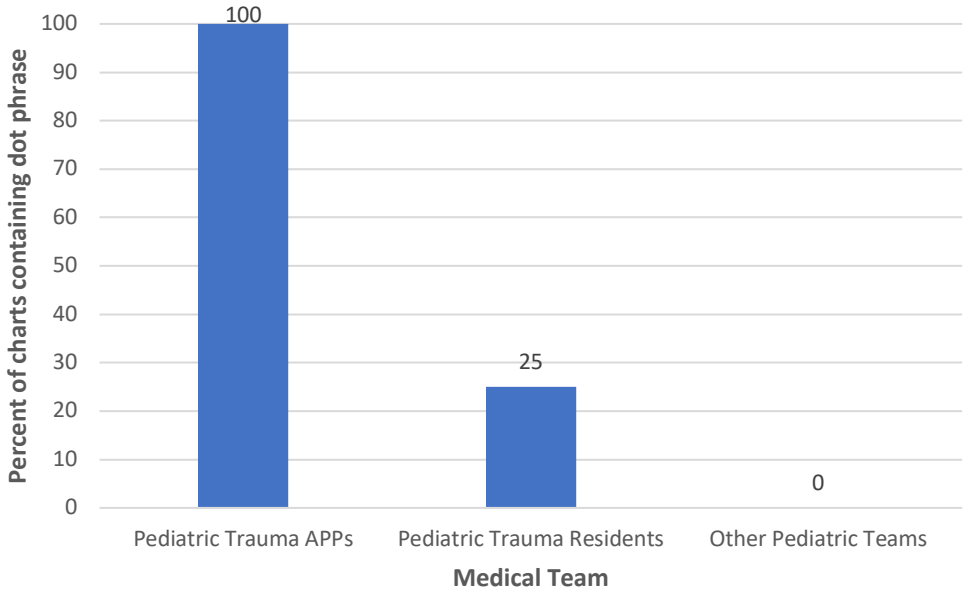
EHR Smart List



Note. Image of EHR screen showing smart list selections for individualization of patient follow-up care.

Figure C2

Dot Phrase Usage by Medical Team



Note. Data collection from September 20 - December 20, 2022. Figure depicts percentage of discharge summaries containing the dot phrase with 100% for pediatric trauma APPs (9 charts), 25% for pediatric trauma residents (1 out of 4 charts) and 0% for other pediatric teams (3 charts)