Decreasing Unplanned Office Visits Due to Cast Problems in the Pediatric Population
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Abstract
Introduction: Unplanned office visits due to cast-related problems in the pediatric orthopedic office are common. Decreasing problems associated with the use of a cast would improve patient safety, increase office productivity, and decrease inconvenience to the child and family. Methods: Pediatric patients treated with a cast in our office were included in the study if they returned for an unplanned office visit due to a cast-related problem. Group 1 received verbal cast care instruction. Group 2 had the same verbal instruction in addition to a written handout identical to the verbal instructions. Group 3 was provided the same verbal instructions and a revised handout limiting the number of instructions and focused on keeping the cast away from water. Results: The study included 550 patients with 146 in group 1, 124 in group 2, and 280 in group 3. Comparing group 1 (10.3%) and group 2 (10.5%), there was almost no difference in the rate of unplanned office visits due to cast-related problems. Combining the revised handout with verbal instructions in group 3, the percentage of patients returning for an unplanned visit was 6%. There was a relative decrease in office visits by 55% and an absolute decrease of 4.5% when comparing group 2 and group 3. Conclusions: There was a decrease in the number of unplanned office visits due to cast problems utilizing a handout focused on keeping the cast dry in collaboration with verbal cast care instructions. However, the decrease was not statistically significant. (Pediatr Qual Saf 2018;3:e111; doi: 10.1097/pq9.0000000000000111; Published online October 9, 2018.)

INTRODUCTION
Problem Description
The purpose of this project was to develop a set of instructions for cast care in the pediatric patient that would decrease unplanned office visits due to problems with a cast. As noted in the Journal of Pediatric Orthopaedics, “unplanned cast changes are a time and economic burden with potentially adverse effects on fracture management.” Currently, we provide verbal cast care instructions. We added written instructions with the goal of decreasing the number of unplanned office visits due to cast-related problems.

Rationale
Unplanned office visits due to cast-related problems are time-consuming and problematic for the patient, their family, and office alike. Decreasing problems associated with the application of a cast would improve patient safety, increase office productivity, and decrease inconvenience to a child and their family. Providing written instruction in addition to verbal cast care instructions would reinforce the importance of proper cast management. The written instructions are available in both English and Spanish.

Specific Aims
This project aimed to decrease unplanned office visits due to cast problems in the pediatric population by 20% using verbal and written instructions about cast care.

METHODS
Context
We conducted this study at an out-patient Orthopaedic Office affiliated with NYU-Winthrop Hospital. The practice sees 4 thousand patients a month on average with 6 hundred explicitly seen by coauthor Dr. Gaffney. This practice has an Orthopaedic Residency affiliation with the State University of New York Stony Brook University Hospital. The Patient population was limited to those 18 years of age and younger and treated by 1 Board Certified, Fellowship Trained Pediatric Orthopaedic Surgeon. Patients were included in the study if they presented to our office with an unplanned visit due to a cast problem.
Patients were excluded from the study if unplanned visits were addressed at another facility and fractures treated with a fracture brace, instead of a cast. Structure of the manuscript followed “Standards for Quality Improvement Reporting Excellence” (SQUIRE 2.0).

**Interventions**

Our current practice uses verbal cast care instructions provided by the Attending Physician and/or the Physician Assistant (Fig. 1). Group 1 included patients who received verbal instructions only, with data collected from October 2016 to January 2017 and reflects the number of patients returning to the office due to cast problems. We considered it a defect if a patient returned for an unplanned office visit due to a cast problem. A cast was considered defective if it was wet, broken, had a foreign body, or patient complaint of increased pain within the cast. Group 2 included patients who received handouts with written cast care instructions in addition to verbal instructions from January 18, 2017 to May 5, 2017. The first handout included all cast care instructions identical to the verbal instructions. The medical assistants audited both the Physician and Physician Assistant separately on 10 patient interactions each, for a total of 20 patients, to verify all verbal instructions matched the written handout. The sample audit confirmed all 20 patients and families received the same verbal and written instructions. The front desk staff audited 10 patients to ensure medical assistants were providing handouts, on cast care, to all patients placed in a cast. The audit found all patients received a handout. The front desk had received the list of patients who received a cast from the medical assistants during the audit sample. Group 3 included patients who received a revised handout with written cast care instructions in addition to the original verbal instructions from June 12, 2017 to November 29, 2017.

After finding no change in the percentage of unplanned office visits when comparing group 1 and group 2, the handout was changed to remove many of the instructions. The new handout focused on instructing the patient and family to keep the cast away from water and not to place anything down the cast (Fig. 2).

**Study of the Interventions**

The project began by evaluating our current method of teaching cast care to patients using verbal instructions and tracking the number of unplanned office visits due to cast problems. After 3 months of providing verbal instructions, we started group 2 by adding a printed handout of cast care instructions that matched the verbal instructions provided. We used the technique of teach-back to confirm patients and family understood and remembered the cast care instructions. Teach-back is a communication tool where patients repeat the instructions, confirming they are understood.2

The data comparing group 1 and group 2 found almost no difference in the number of unplanned office visits due to cast problems. The most common reason for an unplanned visit was due to the cast getting wet. We, therefore, restructured the handout and added a cartoon to emphasize the importance of keeping the cast away from water. Verbal instructions remained unchanged.

**Measures**

Calculating the percentage of pediatric patients who had unplanned office visits due to cast-related problems using verbal and written instructions provided the numerical comparison.

**Analysis**

To best assess the impact of our interventions, the Pareto chart was utilized to focus our attention on the predominant cause for an unplanned office visit for cast-related problems. Though the total number of cast-related problems led to smaller comparison groups, the run chart was useful in indicating a positive change from the start of the study to completion.

**Ethical Considerations**

The system-level initiatives of this project had minimal to no risk. There was no cost to the patients, families participating, or the institution. This project was approved by the institutional review board.

**RESULTS**

**Results**

We documented patients with unplanned office visits due to cast-related problems from October 3, 2016 through May 5, 2017. Group 1 included patients who returned to the office from October 3, 2016 to January 17, 2017. These patients only received verbal cast care instructions. There were a total of 146 patients in group 1 and 15 returned with cast-related problems (10.3%). Of those 15 patients,
there were 5 long arm casts, 3 short arm casts, 1 long leg cast, and 1 thumb spica cast. The cast-related problems included 5 wet casts, 1 complaint of pain in the cast, 4 casts had broken hand portions, 1 had a foreign body, and 3 had cracked heel portions of the lower extremity cast. There were 3 girls and 12 boys. There were 3 patients 0–5 years of age, 4 patients 6–10 years of age, 6 from 11 to 15 years of age, and 2 from 16 to 18 years of age.

There were a total of 124 patients in group 2 and 13 returned with cast-related problems (10.5%). Of those 13 patients, there were 7 short leg casts, 1 long arm cast, 3 short arm casts, 1 cylinder cast, and 1 thumb spica cast. The cast-related problems included 5 wet casts, 3 complaints of pain in the cast, 1 cast had a broken hand portion, 1 had a foreign body, 1 had a cracked heel portion in a lower extremity cast, and 2 broke the plantar aspect of the lower extremity cast. There were 9 girls and 4 boys. There were no patients 0–5 years of age, 6 from 6 to 10 years of age, 5 from 11 to 15 years of age, and no patients from 16 to 18 years of age.

Upon comparing group 1 with group 2, there was almost no difference in the number of unplanned office visits due to cast problems. A Pareto chart (Fig. 3) for group 1 and group 2 revealed the most common causes of an unplanned office visit due to cast problems. The Pareto chart identified wet casts as the most common cause for an unplanned office visit. The handout was revised to focus on keeping the cast dry, and a cartoon was added to reinforce the point (Fig. 2). Remaining written instructions on cast care were removed, but the complete list of verbal instructions remained unchanged.

Group 3 included the complete list of verbal instructions and a revised handout focused on keeping the cast dry from June 12, 2017 to November 29, 2017. There were 280 casts applied and 17 patients returned for an unplanned office visit due to a cast-related problem (6%). In group 3, there were 2 short leg casts, 5 long arm casts, 6 short arm casts, 3 long leg casts, and 1 thumb spica cast. The reasons patients returned for an unplanned office visit due to a cast problem included 13 wet casts, 3 complaints of pain, and 1 broken hand portion. There were 6 girls and 11 boys. There were 4 patients 0–5 years of age, 6 between the ages of 6–10, 6 between the ages of 11–15, and 1 from 16 to 18 years of age.

Figure 4 is a run chart of the change in the percentage of recasted patients during the 3 study periods. The percentage of cast complications requiring recasting decreased after the introduction of the modified written and verbal instructions for group 3.

**DISCUSSION**

*Summary*

The comparison between group 1 and group 2 showed almost no change in the number of patients returning for unplanned office visits due to cast problems. The handout was then revised to focus on preventing the cast from getting wet. Additional changes to the handout included decreasing the number of instructions and adding a cartoon to reinforce keeping the cast away from water. After making changes to the handout, there was a relative decrease in unplanned office visits due to
cast-related problems of 55% and an absolute decrease of 4.5%. Though the observed difference was not statistically significant ($P$ value = 0.15), when comparing month to month there is a notable difference in group 3 for the percentage of patients recasted (Fig. 4).

Interpretation

Thoughts initially were that the number of cast-related problems might already be at its lowest possible number with almost no difference between group 1 and group 2. Changing the handout did lead to a reduction in the number of unplanned office visits due to cast problems. Reducing the number of written instructions, focusing on the most common cast problem and adding the cartoon showing avoidance of water helped the child and parent understand the importance of keeping the cast dry.

Limitations

Limitations with this study include the time of year the project took place. In summer months children are near pool/sprinkler amusement areas compared with winter months, and we typically see more wet cast issues. Due to time constraints completing the study, we were unable to compare the same season, over 2 years, without handouts.
versus with handouts to see if a difference would be noted. The level of education of the parents varies and may impact the ability to understand or read instructions. There were families where English was a second language, and this could impact comprehension of cast care instructions. The age of the patient, type of cast applied, and length of time in the cast were not taken into consideration but could have affected the risk of developing a cast problem requiring an unplanned visit. Adjustments to the handout focused on unplanned office visits for wet casts, additional studies focusing on ways to decrease the breakdown of the heel and hand portion of the cast may also prove beneficial based on the Pareto chart implications (Fig. 3).

Conclusions
We were able to decrease the number of unplanned office visits due to cast problems by focusing on the original list of verbal instructions and changing the handout to emphasize the avoidance of water. The decrease in unplanned office visits was less than expected and a larger cohort extended over 2 years would bring a more accurate comparison from season to season. Our office recently started utilizing waterproof casting material. Use of waterproof casting material is an area for further study, as it may lead to a reduction in cast-related problems due to water exposure. Waterproof cast padding was not available during the time frame of our study. Even though our results were not statistically significant, there was a reduction in unplanned office visits due to cast problems. These findings may help provide the groundwork for other institutions to conduct similar studies, further decreasing unplanned office visits due to cast problems and increasing productivity and overall patient satisfaction.

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DISCLOSURE
The authors have no financial interest to declare in relation to the content of this article.

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