

# Reducing Cast Complications in a Pediatric Hospital

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## INTRODUCTION

In orthopedic practice, casts are frequently used as a routine treatment for traumatic injuries and various musculoskeletal pathologies. Casts are applied and removed by orthopedic residents in training, physician extenders (AHP) such as nurse practitioners or physician assistants, cast technologists, and attending surgeons. Complications can occur during cast application, throughout the immobilization process, and during cast removal.

### Potential Causes For Complications:

- Improperly or irregularly applied padding
- Insufficient padding leading to sharp edges
- Aggressive molding
- Hot water to activate casting material
- Cast saw use during removal

The incidence of skin complications in children treated with upper and lower extremity casts is not well known. The incidence of skin complications in children treated with hip Spica casts occurs anywhere from 15% to 38% of the time. Cast saw injuries occur at a rate of 1.23 per 1,000 cast removals (0.12%) in a large pediatric institution, compared to 0.72% rate of cast saw cuts or burns in an adult fracture clinical setting.



## BACKGROUND

Nationwide Children's Hospital applies more than 9,000 casts each year.

Baseline rate of casting complications 5.6 complications per 1,000 casts applied (0.56%)

**Categories of Complications:** determined using Pareto Principle

- Cast Saw Burns - 22 (91.7%)
- Pressure Ulcers - 2 (8.3%)
- Other - 0 (0%)

We focused our efforts on improving application and removal techniques, along with dedicated education strategies for our providers with the goal of decreasing the overall complication rate to 1 complication per 1,000 casts applied.

## METHODS

### EDUCATION

#### New Resident Education

- Differences between plaster and fiberglass casts
- How to apply a Webriil® short arm cast
- How to safely remove the cast using a cast saw
- Practiced techniques by applying and removing casts under direct supervision.
- Cast safety strips (AquaCast® Saw Stop® DE-FLEX™ Protective Strips, Newark, DE) were a required for **every** cast applied.
- Lead cast technician or an orthopaedic attending measured competency and recorded using the criteria outlined in the new Performance Assessment Form.
- Require demonstrated competency with three cast applications and removals before they were permitted to apply or remove casts independently.

#### New Cast Technician and Physician/AHP Education

- Required to successfully apply all types of casts
- Required to successfully apply 5 of each type cast on patients under the supervision of an approved cast technician or an attending physician.
- Physicians and AHPs training also included properly standardized documentation for billing and coding to ensure proper documentation of complications.

### EQUIPMENT AND SUPPLIES

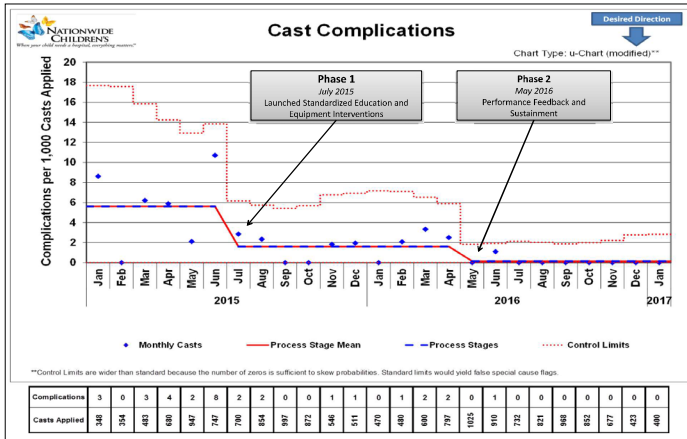
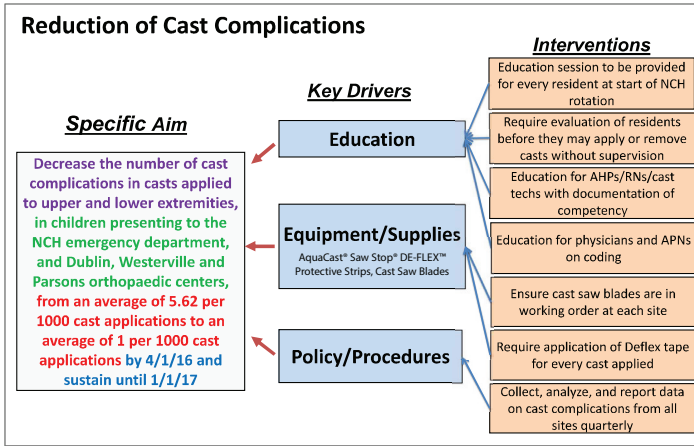
We reviewed stocking procedures and policies to verify that the process in place was sufficient to ensure adequate inventory of cast safety strips, cast saws, and blades in good repair.

### POLICIES AND PROCEDURES

#### Modifications to our policies and procedures:

- Require AquaCast Saw Stop DE-FLEX Protective Strip applications when casting
- Require certified training of residents and cast technicians

# AIM AND KEY DRIVER DIAGRAM



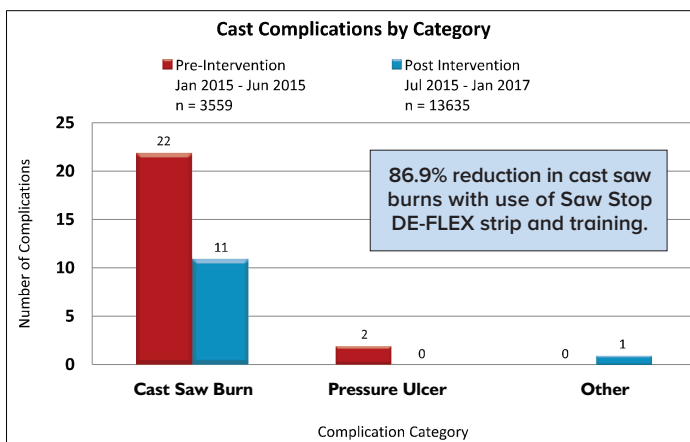
## RESULTS

### Phase 1: July 2015-April 2016

- Interventions accomplished a significant change in the system and its performance, with our **mean rate reduced by 71.35%** to 1.61 complications per one thousand applications (P<0.01) from July 2015-April 2016.

### Phase 2: May 2016- January 2017

- As providers received feedback from the project lead and continued to hone their already improved techniques, the mean rate continued to drop. Our sustainment period showed **continued success with an additional reduction of 90.68% (P<0.01) compared to Phase 1, and 97.33% (P<0.01) when compared to baseline.**



## CONCLUSION

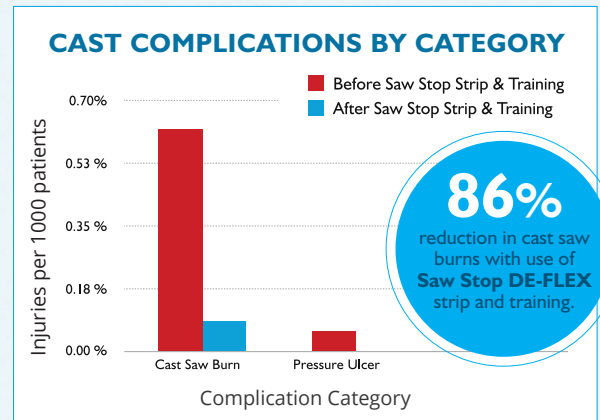
The dedicated education strategies surrounding cast application and removal techniques proved an effective improvement intervention.



# Saw Stop® DE-FLEX™

Protective Strip by AquaCast®

Our Saw Stop DE-FLEX protective strips are tough, waterproof, flexible ribbons that provide an added layer of protection from a cast saw. Two styles are available, both of which are 1-1/4 inches wide and 10 feet long and feature adhesive backing for ease of application.



Balch Samora J, Samora WP, Dolan K, Klingele KE. A quality improvement initiative reduces cast complications in a pediatric hospital. *Journal of Pediatric Orthopedics*. 2018 Feb; 38(2):e43-e49.



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