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Increasing incentive spirometry use in patients with sickle cell disease: Longer follow-up of PDSA Cycle 1

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Increasing Incentive Spirometry Use in Sickle Cell Patients

Alex Prosser and Thomas Cochran

May 8th, 2023



Why we care about incentive spirometry...

- Acute chest syndrome (ACS) is the 2nd most common cause of admission for patients with sickle cell disease
- Leading cause of death in children with sickle cell disease (SCD)
- Significant morbidity due to increased risk for chronic lung disease and pulmonary hypertension
- Nearly half of all ACS develop during a hospital stay

****Incentive spirometry (IS) has been shown to prevent ACS****

Acute Chest Syndrome

- Pathophysiology
 - Lung is injured/inflamed/under ventilated →
 - sickled cells adhere to endothelium →
 - can't reoxygenate →
 - more inflammation and lung infarction
- Associated with infection, fat embolism, atelectasis, pulmonary edema
- Clinical symptoms
 - Fever, chest pain, cough, tachypnea, hypoxemia
- Diagnosis
 - New pulmonary infiltrate on CXR + 1 or more above symptoms
- Treatment
 - Supplemental O2 and pulmonary hygiene
 - Simple transfusion
 - Antibiotics
 - Pain control
 - IF worsening → exchange transfusion



The problem



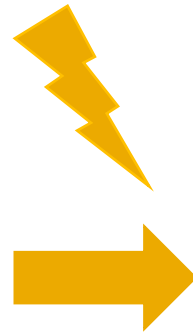
- NHLBI SCD guidelines ➡ provide 10 inspirations every 2 hours while awake in order to reduce the risk of ACS in patients with SCD admitted to the hospital
- **At Children's Mercy, we are NOT meeting these guidelines for our patients**

1st PDSA data

BASELINE DATA

- 8/2021- 11/2021
- 191 hospital days
- 53% hospital days with IS documented (101/191)
- Of those encounters with IS
 - 6.3 hr median hours between IS
 - 0% of hospital days with recommended frequency of IS

Updated and standardized IS orders in powerplans

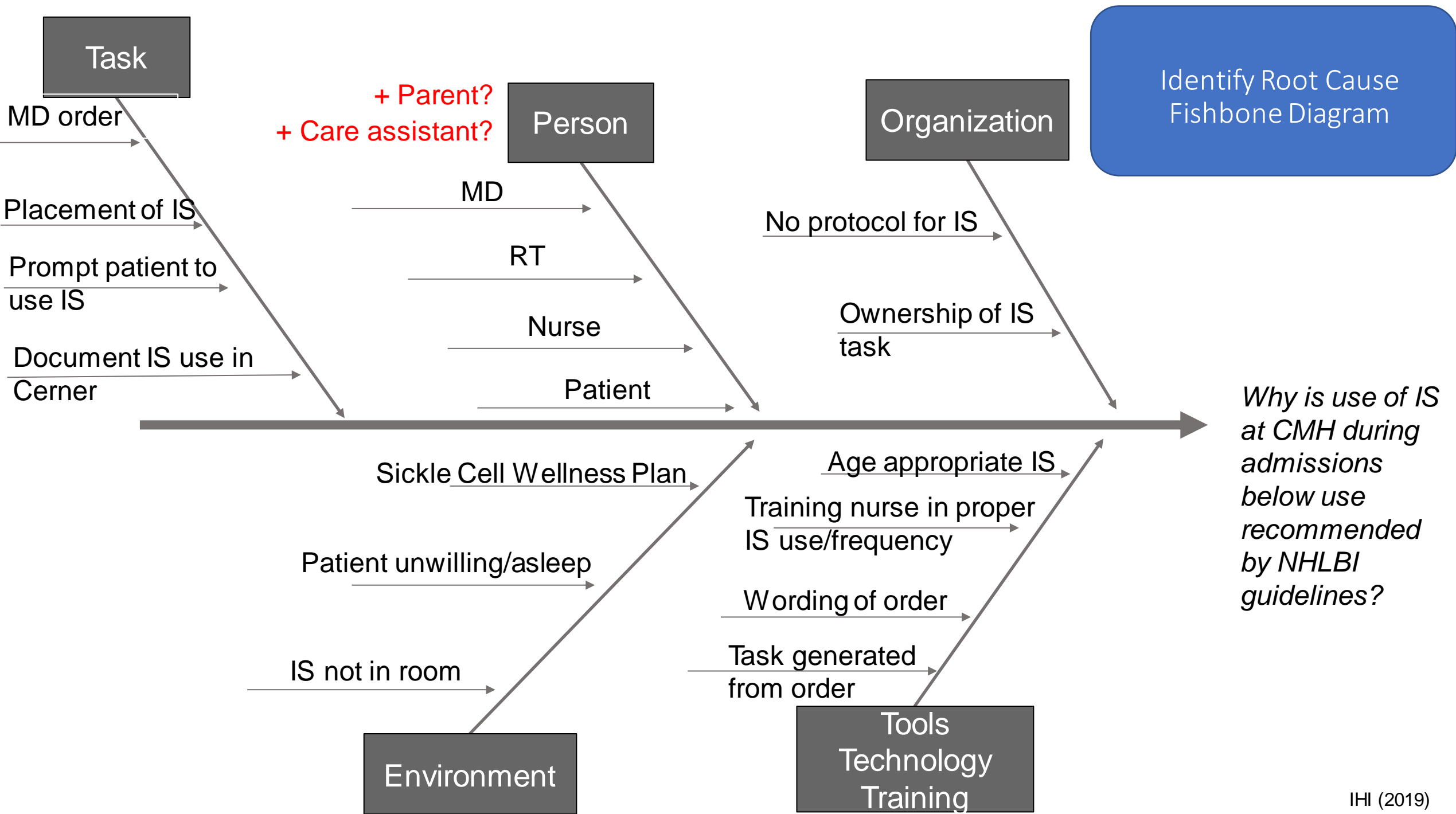


POST-INTERVENTION

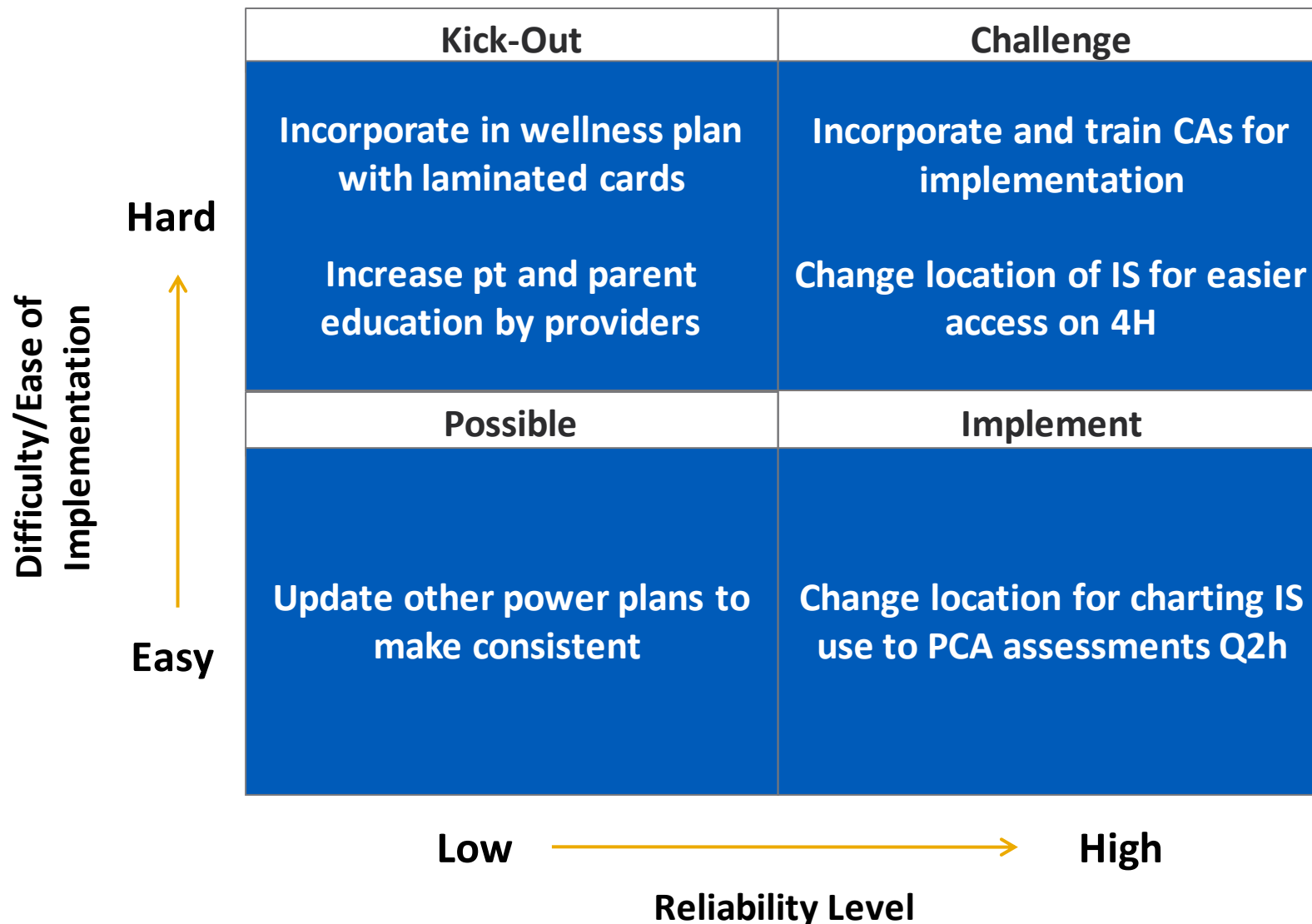
- 12/2021- 3/2022
- 164 hospital days
- 40% hospital days with IS documented
- Of those encounters with IS
 - 5.9 hr median hours between IS
 - 2% of hospital days with recommended frequency of IS

2nd PDSA baseline data

- 8/2022-11/2022
- 167 hospital days
- **25.7%** (43/167) hospital days with IS documented at least once
- Of those with documented IS
 - **3.0** Median hours between (when multiple IS documented, 61% or 11/18 encounters)
 - **12%** (5/43) with recommended frequency of IS



**Develop and Implement
Countermeasures: PICK Chart**



Fields added to the nursing PCA form

Incentive spirometry Type

Incentive spirometer

Pinwheel

Bubbles

Other

Number of breaths performed

_____ Volume Achieved Incentive Spirometry

_____ Number of Breaths Incentive Spirometry

Set target...

Increase IS number of daily occurrences and documentation to meet NHLBI guidelines in sickle cell patients admitted for vaso-occlusive pain from 12% to 25% over 3-month period from June 1st to September 1st, 2023.

Future PDSA cycles...

- Discuss possible interventions
 - Clarify roles in implementation and any barriers
 - Education for nursing
 - Education for rotating residents with their orientation to utilize the Cerner powerplan with IS
 - Role of care assistant
 - Implement more prompts/incentives for the patient

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