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May 13th, 12:15 PM - 12:30 PM

A quality improvement project to improve antibiotic choice for children admitted with urinary tract infections (UTIs)

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A quality improvement project for children admitted with urinary tract infections (UTIs)

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Disclosures

- None

Background

- UTIs 7.8% of all pediatric infections
- Most caused by *E. Coli*
- CMKC antibiogram
 - 96% *E. Coli* susceptible to first generation cephalosporins (FGC) like cephalexin and cefazolin

												
Children's Mercy Hospitals & Clinics - 2022 Antibiogram Department of Pathology & Laboratory Medicine- Microbiology Laboratory												
2022 Gram Negative - URINE ONLY- Antibiogram (% susceptible)												
Organism	# of isolates tested	Ampicillin	Amox/clav	Cefazolin	Cefepime	Ceftazidime	Ceftriaxone	Ciprofloxacin	Gentamicin	Nitrofurantoin	Tobramycin	Trimeth/Sulfa
<i>Enterobacter cloacae</i>	37	IR	IR	IR	-	89	86	100	100	46	100	91
<i>Pseudomonas aeruginosa</i>	59	-	-	-	93	97	-	92	88	-	98	-
<i>Escherichia coli</i>	1459	60	83	96	-	98	98	92	94	98	94	79
<i>Klebsiella oxytoca</i>	44	IR	95	18	-	95	93	100	98	95	98	80
* <i>Klebsiella pneumoniae</i>	113	IR	92	95	-	96	96	96	95	33	96	83
* <i>Proteus mirabilis</i>	84	86	94	98	-	100	100	99	98	IR	98	93

ESBL positive isolates: *E. coli* (55), *K. pneumoniae* (8), *K. oxytoca* (2)

IR = Intrinsic Resistance, (-) = No data available

**E. coli*, *K. pneumoniae* and *P. mirabilis* breakpoints differ for urine culture vs. cultures from all other sources. Please contact the Microbiology laboratory for more information.

CMH New clinical pathway released in May 2022

Empiric Therapy

Pyelonephritis or unknown:

Oral:

Cephalexin (high dose) 75 to 100 mg/kg/day divided q8h (max: 1000 mg/dose)

IV:

Cefazolin (high dose) 100 mg/kg/day divided q8h (max: 6g/day)

IM:

Ceftriaxone 50 mg/kg/dose IM q24h (max: 2000 mg/dose)

Cystitis:

Oral:

Cephalexin 25 - 50 mg/kg/day divided q8h (max: 500 mg/dose)

For **severe** cephalosporin allergy

For **severe** penicillin allergy



QR Code for mobile access

- Baseline data: 71% children admitted to hospitalist team with UTI started on ceftriaxone

AIM Statement

- Increase the percentage of patients 60 days and older admitted to the hospital medicine team with a diagnosis of UTI, and treated with FGCs from 29% to 60% by June 2024

Patients where FGC may not be indicated as empiric choice

- < 60 days of age
- Chronic kidney disease
- Urological abnormalities
- Pregnancy
- Immunocompromised hosts
- Presumed/confirmed meningitis
- Concern for sexual abuse
- History of multi-drug resistant infections
- Concern for sepsis
- Admitted to the PICU, renal service
- Previous UTI with resistant bacteria

Methods

- Outcome measure: % patients 60 days and older admitted to the hospitalist team and diagnosed with UTI receiving FGC out of all cephalosporins
- Process measures:
 - % patients initiated on FGC in the emergency department (ED)
 - % patients admitted through the ED initiated on FGC
 - % patients changed from a broad spectrum cephalosporin to FGC within 36 hours of their first antibiotic dose
- Balancing measure: % patients with resistance to FGC



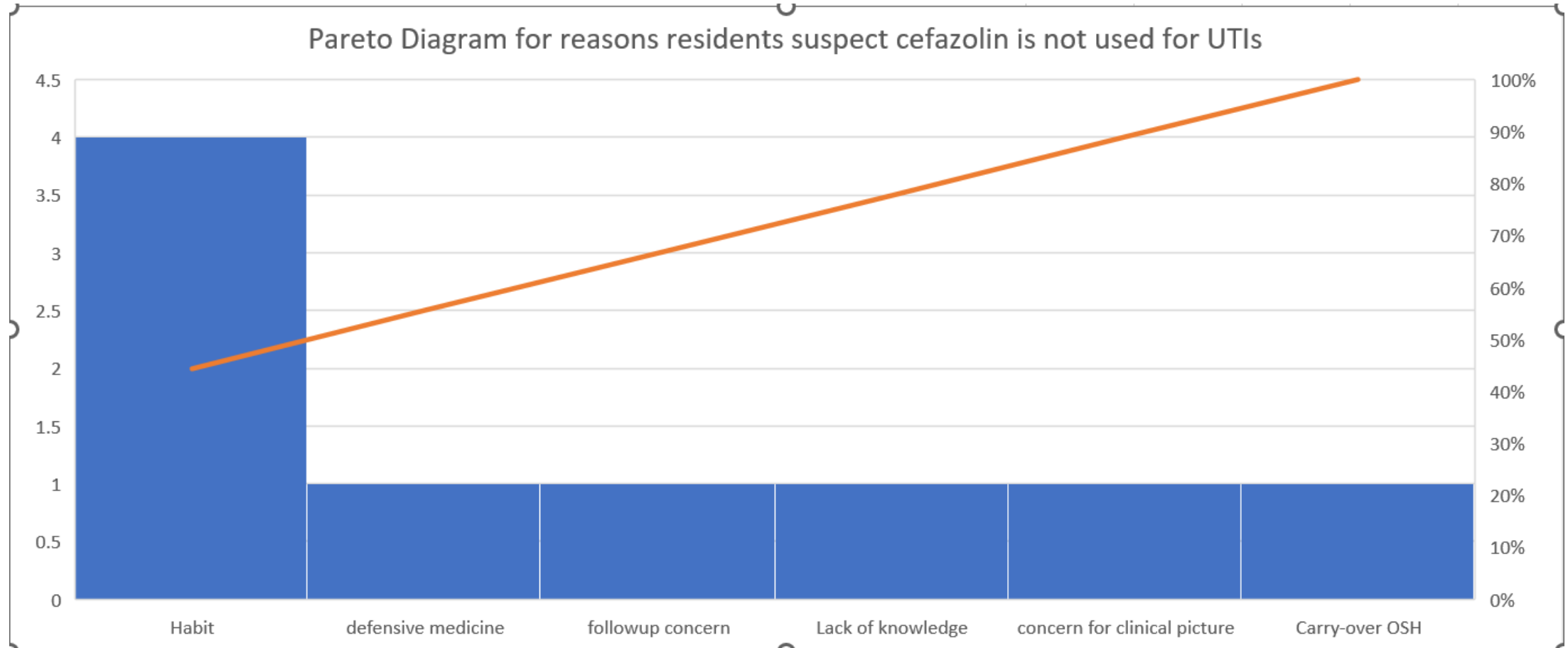
Methods

- April 2022: Multidisciplinary team formed: med-peds resident, infectious diseases physician, hospital medicine physicians, nurse, and emergency department physician
- July 2022: Survey to residents, generated Pareto diagram
- August 2022: Created cause and effect analysis, generated fishbone diagram; brainstormed interventions, generated PICK diagram
- Generated Plan-Do-Study-Act (PDSA) cycles

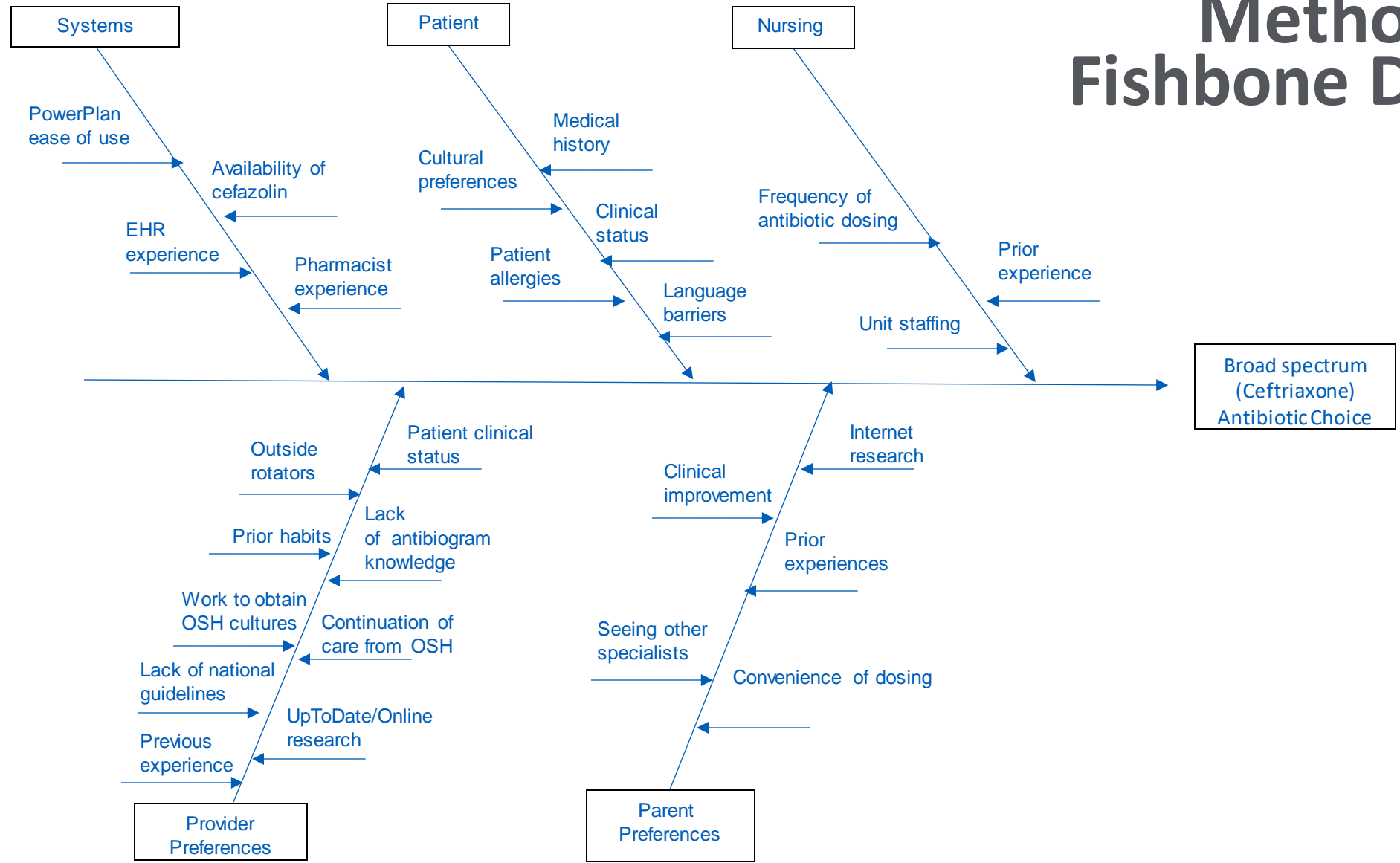
Methods: Survey

- Multiple choice: What year are you in residency?
- Free response: 90% of our urinary tract infections (UTIs) are empirically treated with broad-spectrum antibiotics, such as ceftriaxone. However, according to the CMH antibiogram, the vast majority (96%!) of our urine pathogenic isolates can be treated with a narrow-spectrum antibiotic, including cefazolin. Knowing this information, why do you think ceftriaxone continues to be empirically prescribed for patients > 60 days of age with suspected UTI?

Methods: Pareto Diagram

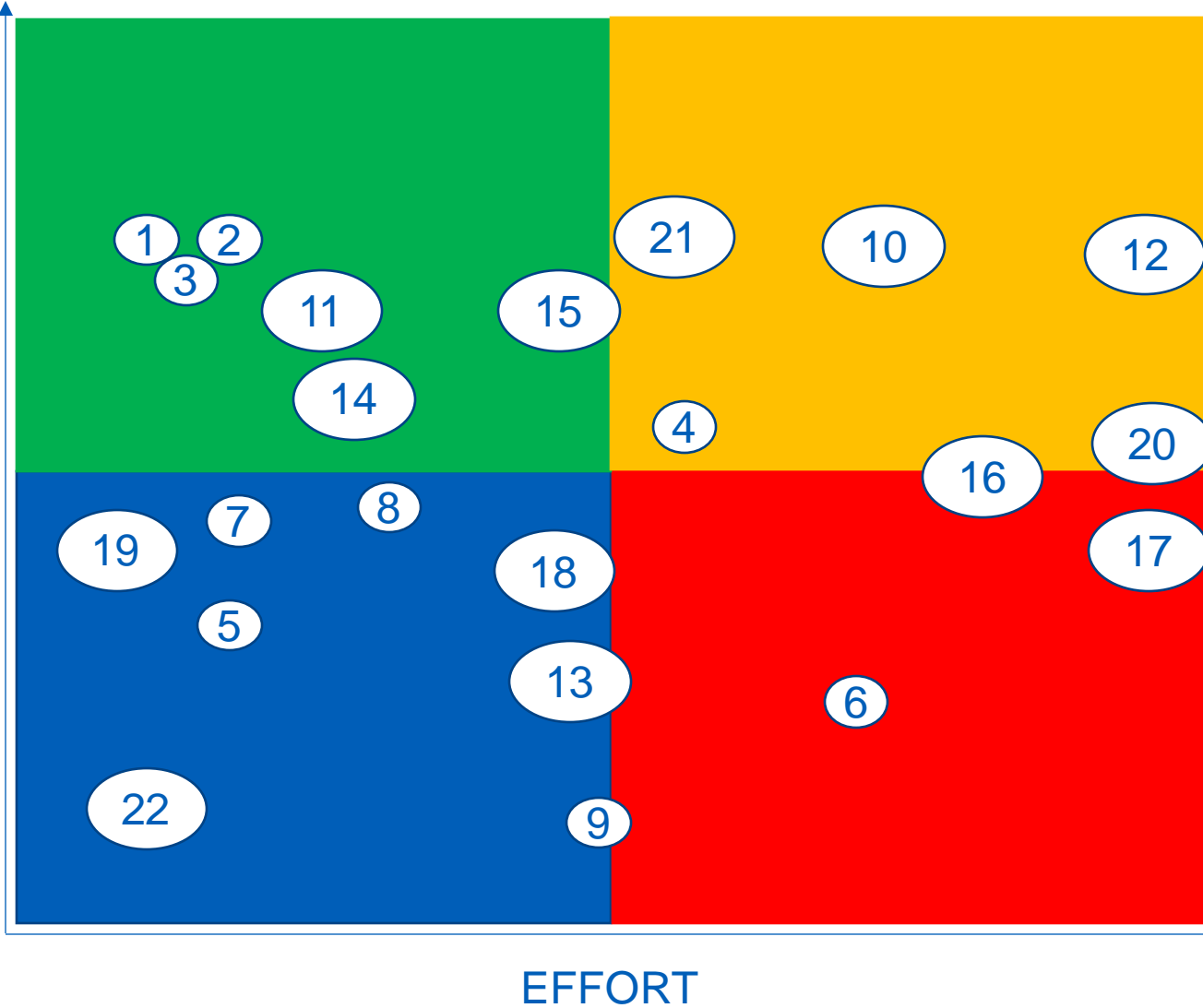


Methods: Fishbone Diagram



Methods: PICK Diagram

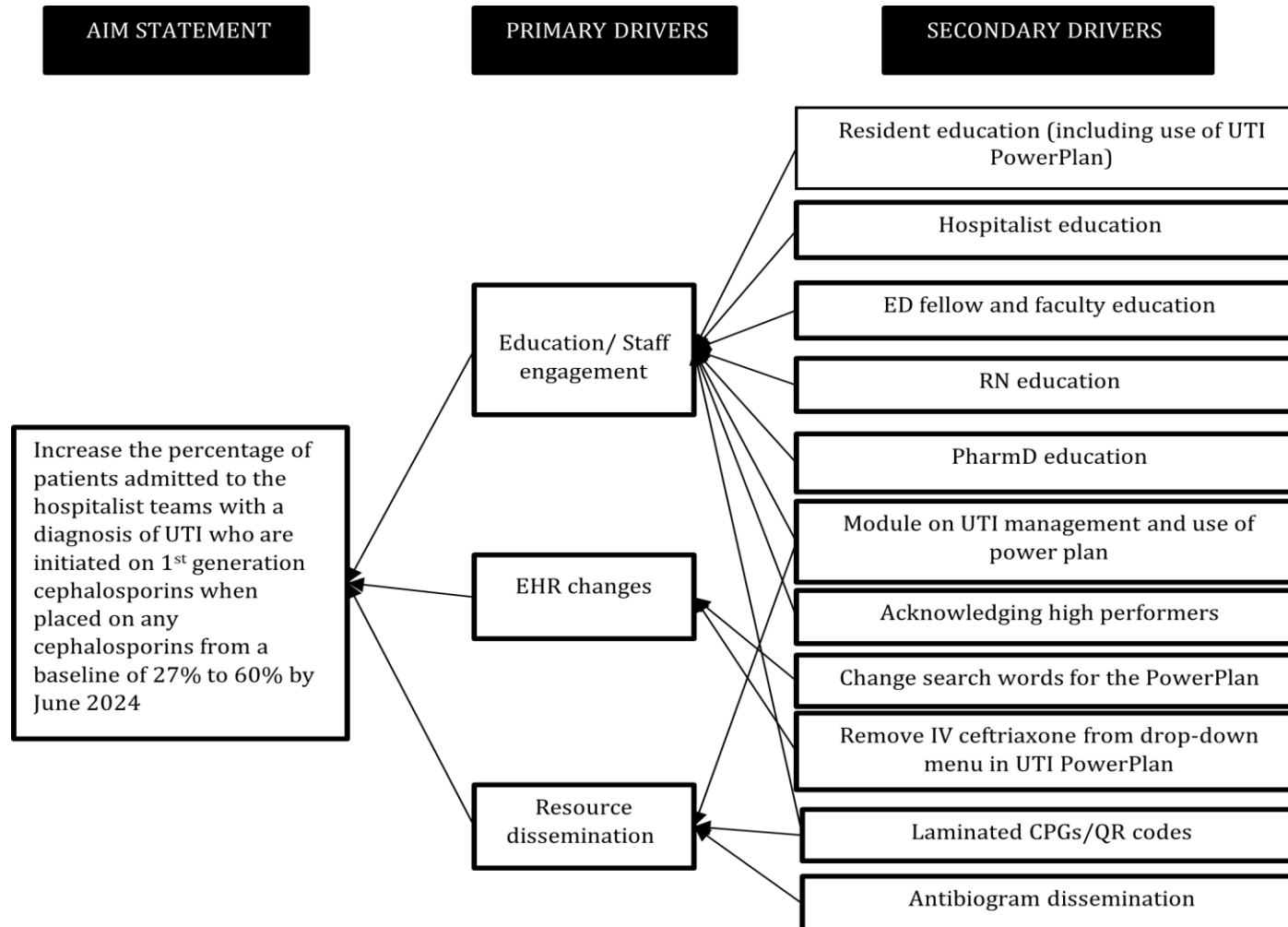
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1. Resident education
2. Faculty education - ED
3. Faculty education - hospitalists
4. Module on use of power plan
5. Pharmacist education
6. ASP intervening on all UTI on broad ATBs
7. Antibigram dissemination (Blue book, Scope)
8. RN involvement - find an RN champion
9. RN education – comfort
10. Cerner – drop-down list (remove ceftriaxone from UTI/pyelo PP)
11. CPG QR codes laminated in workrooms
12. Application for CPGs
13. Brochure for patients
14. Education around use of UTI-specific power plan
15. OSH records – team coordinator (urine cx obtained elsewhere)
16. Change search words for PP in CPG
17. Pop-up window when you choose ceftriaxone for UTI
18. Acknowledging high-performers
19. Education FM/Truman ED residents
20. On-time report of current patients with UTIs – evaluate daily
21. Having a comment in the indication for UTI stating cefazolin is drug of choice
22. Link Rise module to the CPG



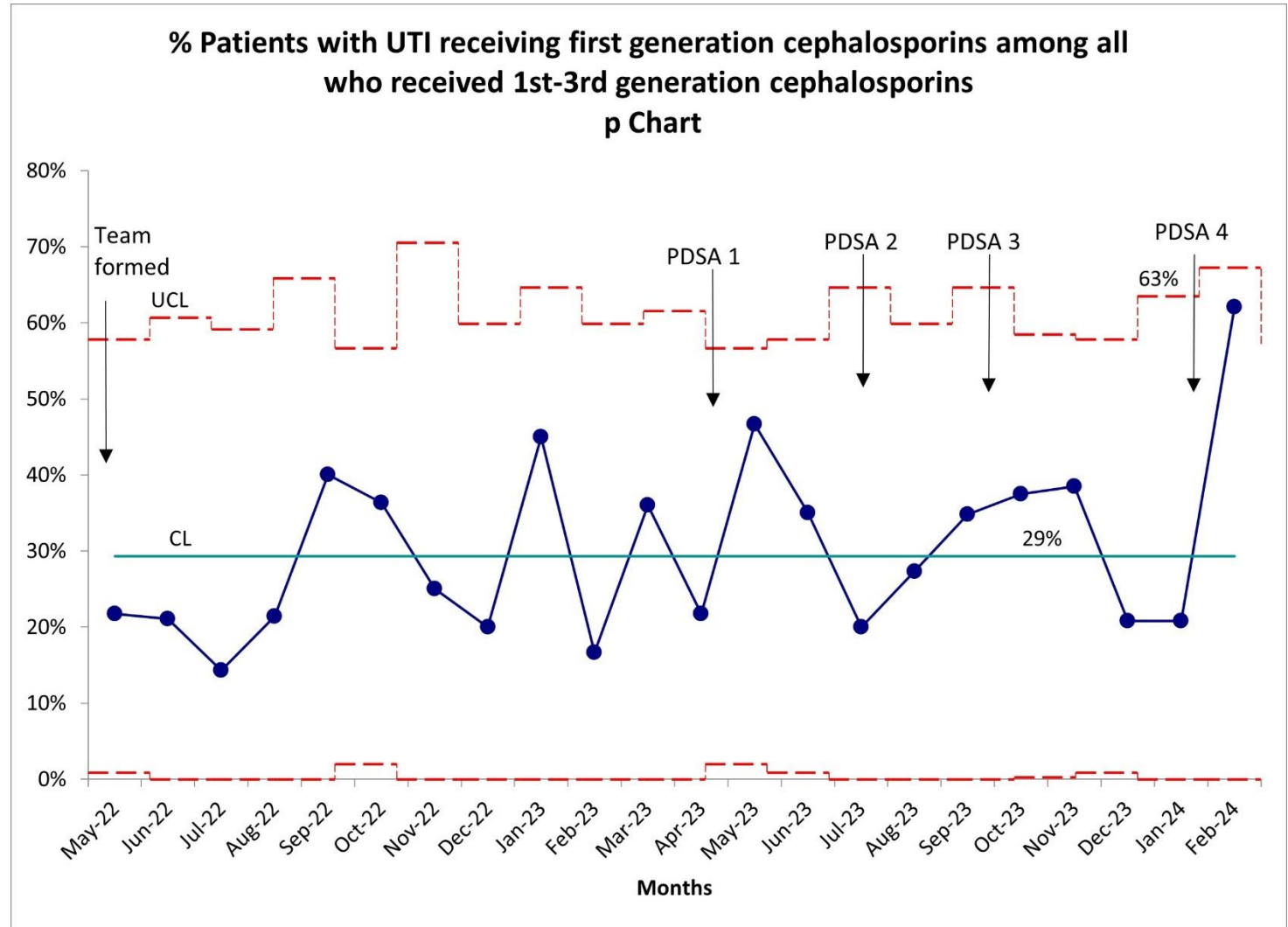
Methods: Driver Diagram



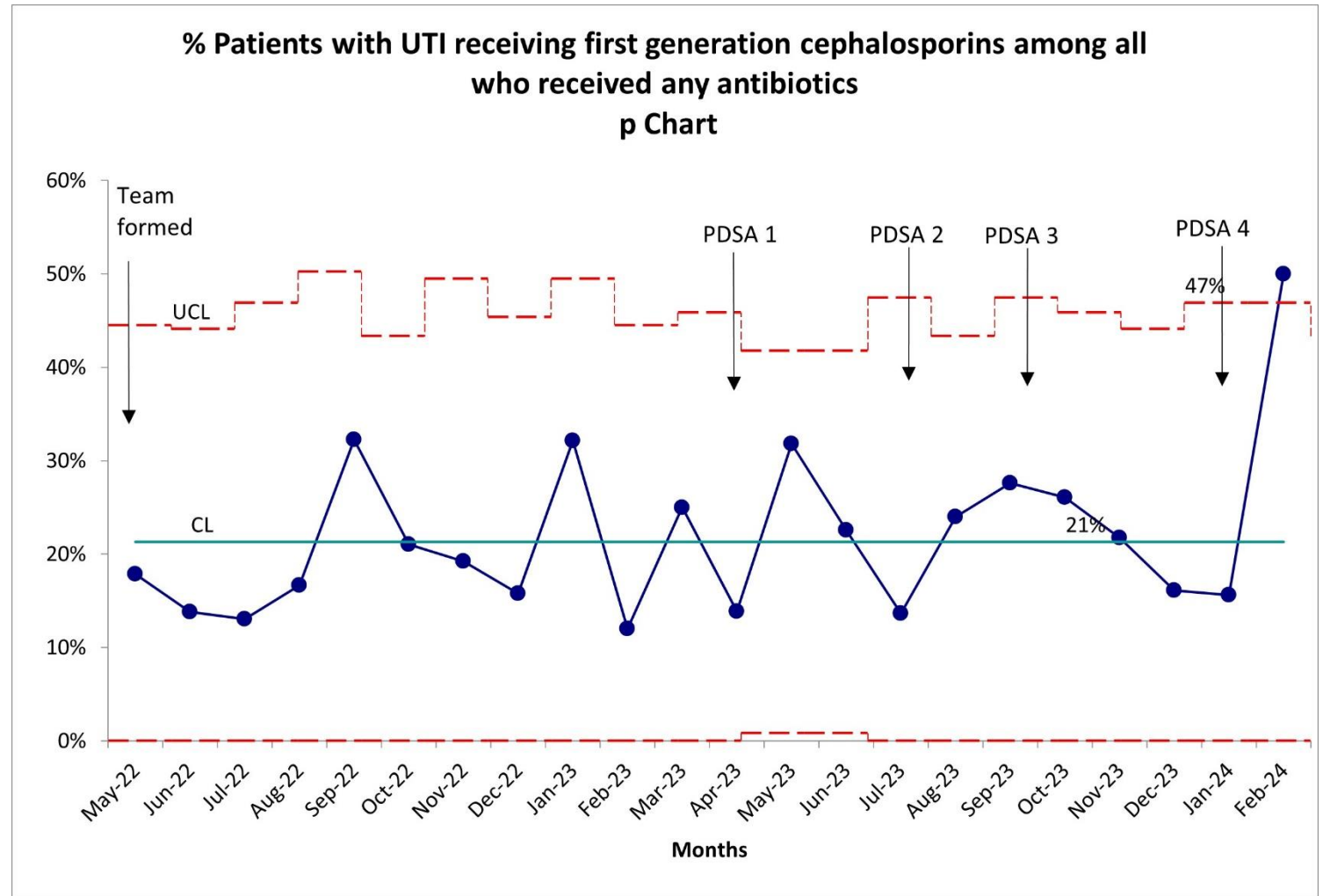
Methods

- PDSA Cycles
 - Cycle #1: Pediatric Resident Education (April-July 2023)
 - Cycle #2: Updated PowerPlan Terminology and Search Terms (July 2023)
 - Cycle #3: Hospitalist and Pediatric Emergency Department Education, one page document for rotating family medicine residents/inpatient teams (September 2023)
 - Cycle #4: RISE Module, SBAR sent to stakeholders, Clinical Pathway QR codes, University Health Emergency Department Education (January 2024)
 - Amazon Gift Card Giveaway

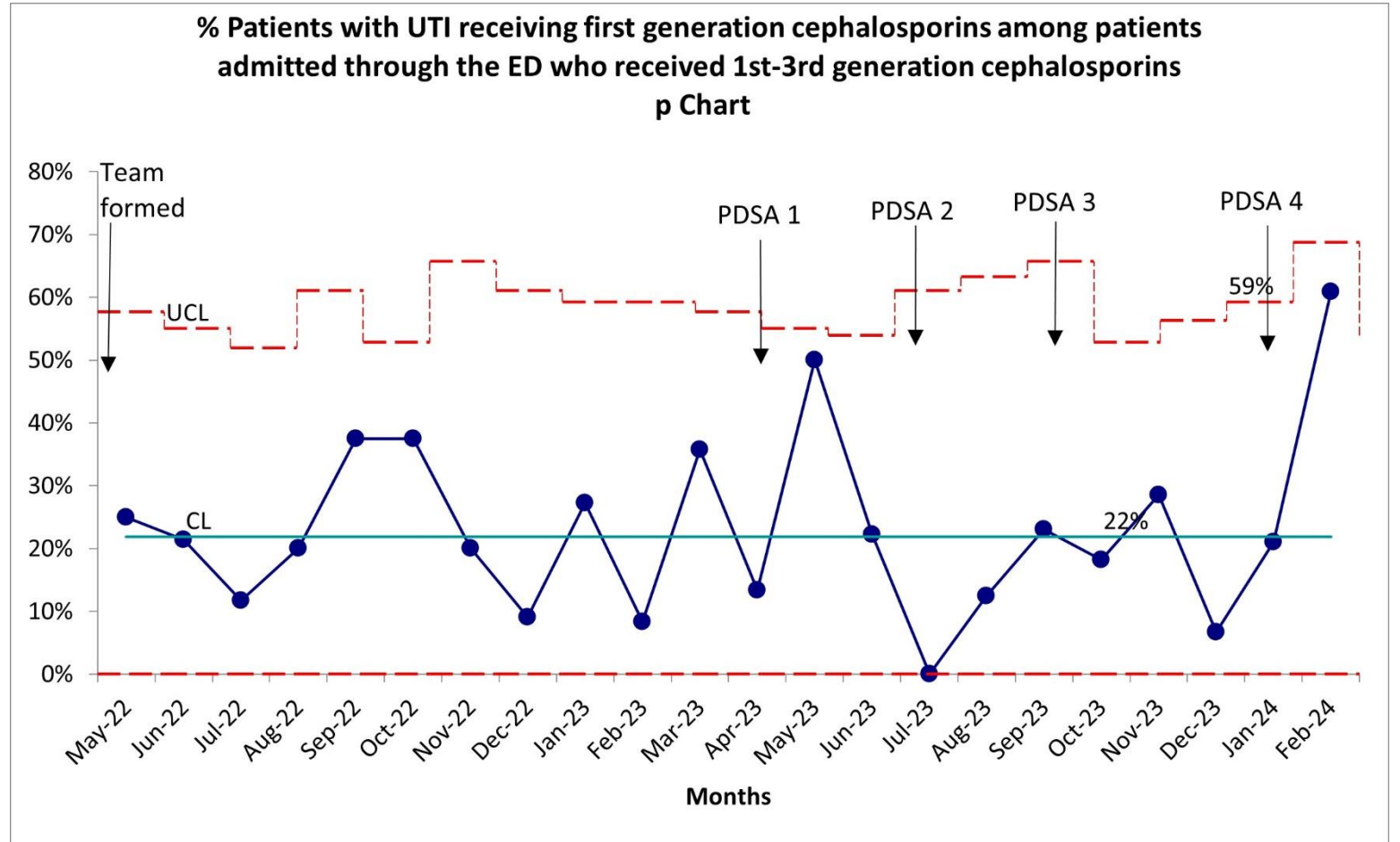
Results - Outcome



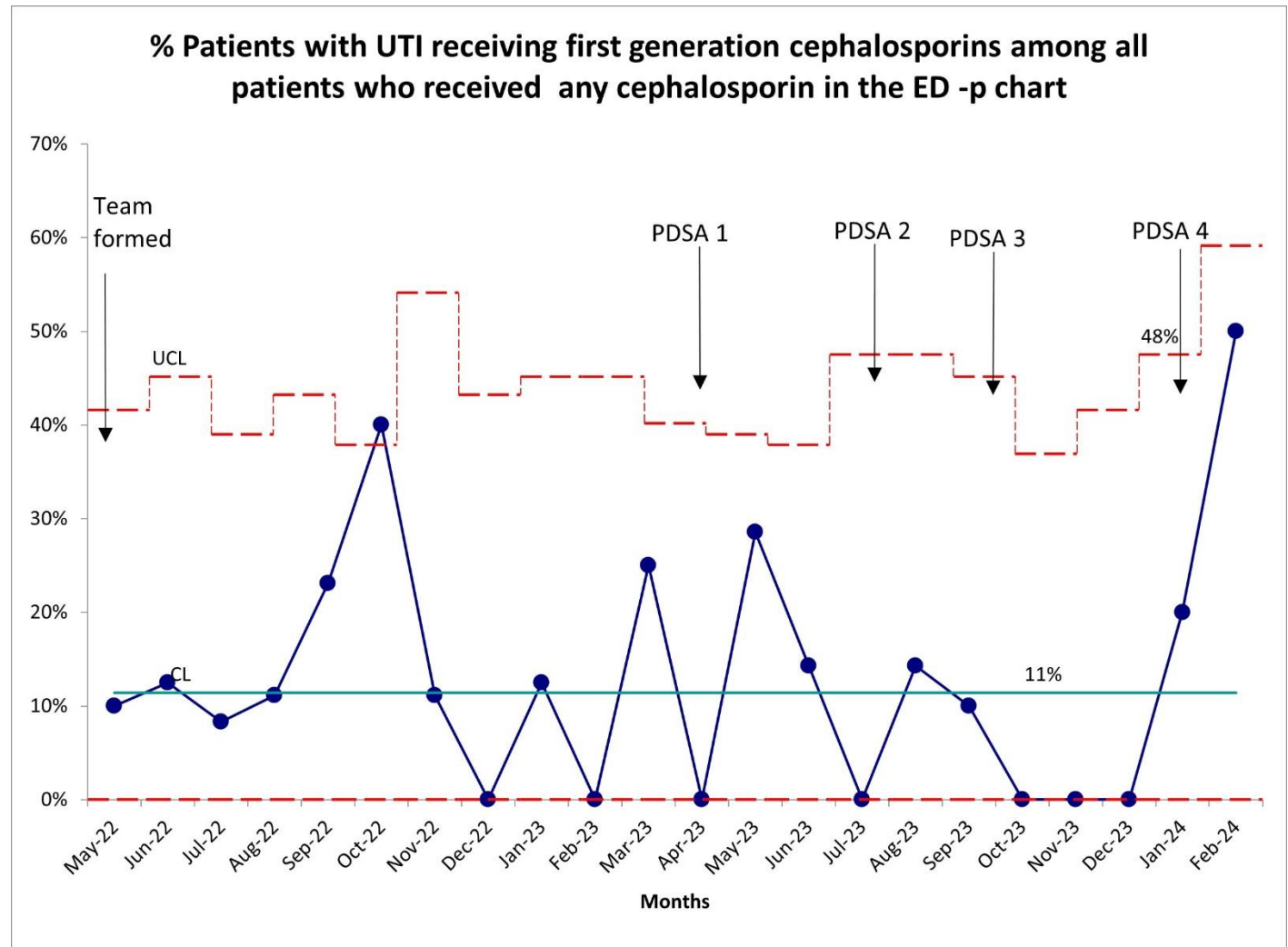
Results - Outcome



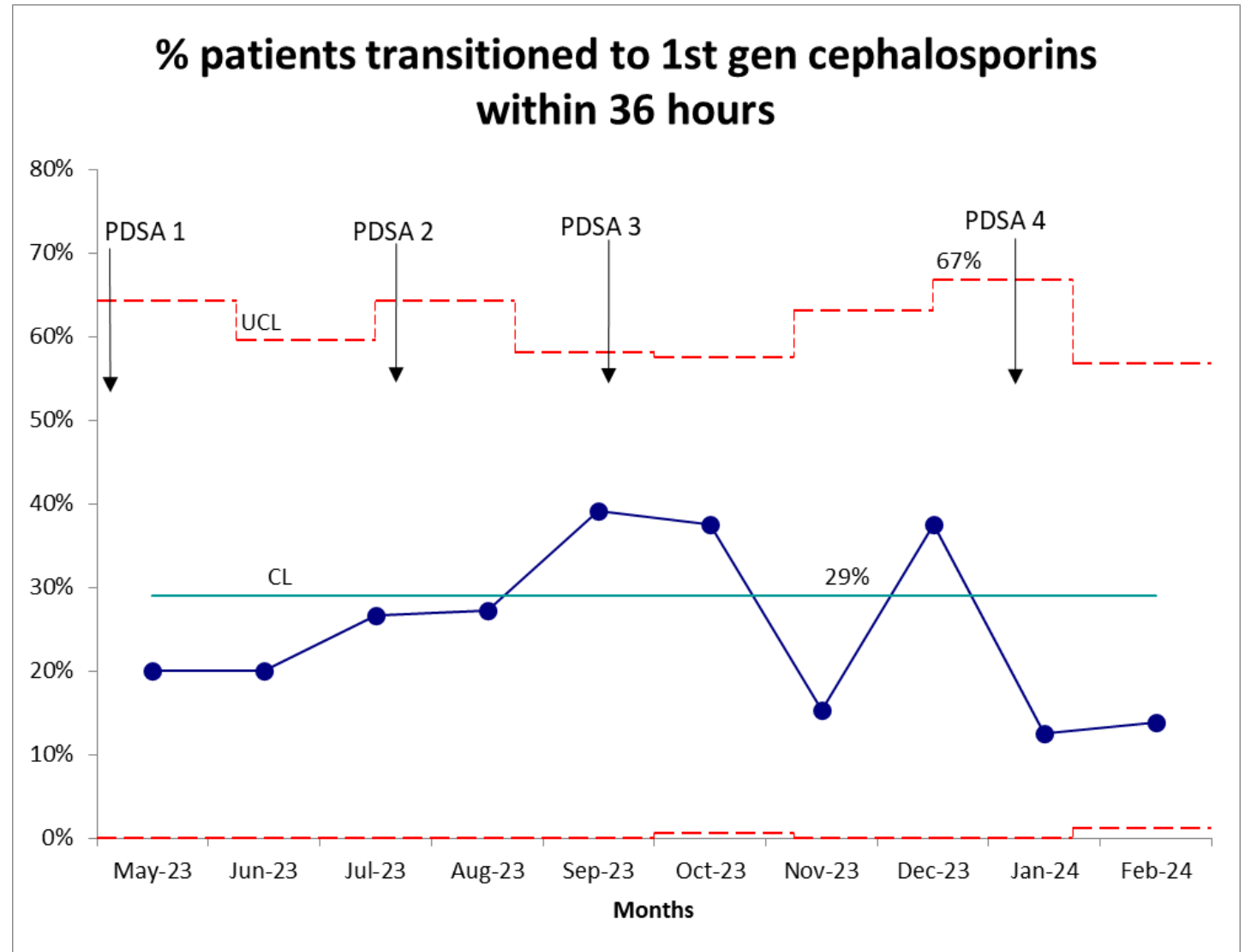
Results - Process



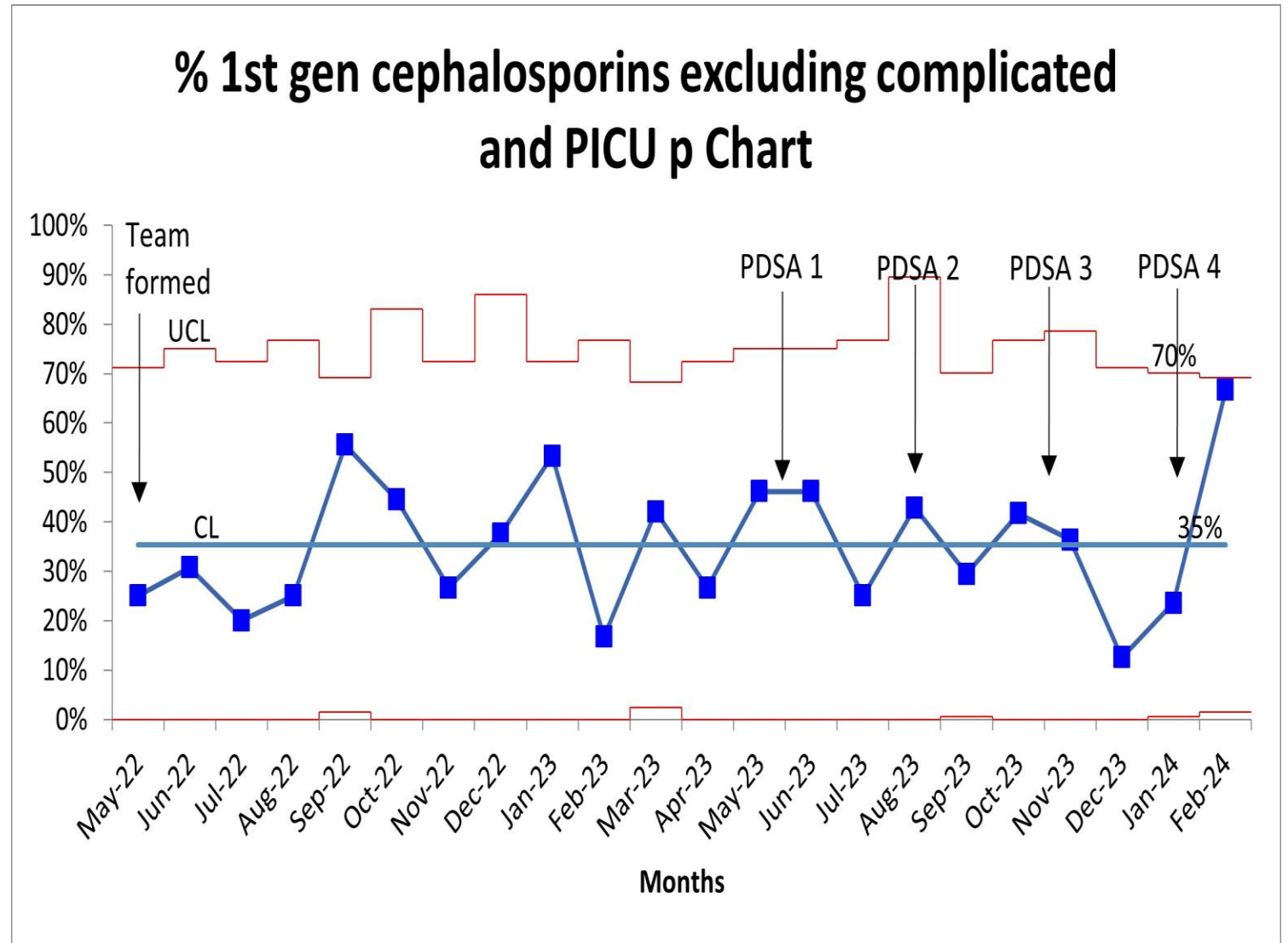
Results - Process



Results - Process



Results - Process



Limitations

- Some PDSA cycles have multiple interventions
- Some interventions could not be done after talking with medical informatics
- Data is one month behind
- Data collection not yet finished

Future Directions

- PDSA #4 shows most promising results
- Continue to track data
- PJ stepping down, project will continue
- Focus on the ED for further interventions, not yet meeting 60% metric
- Continued engagement with stakeholders

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- Dr. Adrienne DePorre, MD
- Dr. Kathleen Berg, MD
- Dr. Allison Hadley, MD
- Viktoriya Stoycheva, MHA, RN, CPN

