

Project Title

Improve Appropriate Referral of Contrast Enhanced Ultrasound (CEUS) in Diagnostic Radiology TTSH

Project Lead and Members

Project lead: Adj Asst Prof Ashutosh Prakash

Project members:

- Dr Ormasa Maria Constanca
- Dr Tan Teck Wei
- Ms Jegatheeswari
- Ms Quijano Jocelyn Soriano

Organisation(s) Involved

Tan Tock Seng Hospital

Healthcare Family Group(s) Involved in this Project

Ancillary Care

Applicable Specialty or Discipline

Diagnostic Radiology

Project Period

Start date: Apr 2019

Completed date: Nov 2020

Aims

To increase appropriate referral of Contrast Enhanced Ultrasound (CEUS) in Diagnostic Radiology TTSH from 33% to >75% in 6 months.

Project Attachment

See poster attached/below

Background

See poster attached/below

Methods

See poster attached/below

Results

See poster attached/below

Lessons Learnt

See poster attached/below

Conclusion

See poster attached/below

Additional Information

Accorded the NHG Quality Day 2022 (Category C: Developing a Flexible & Sustainable Workforce) Merit Award

Project Category

Care & Process Redesign

Access to Care, Referral Rate

Keywords

Contrast Enhanced Ultrasound, Appropriate Referral

Name and Email of Project Contact Person(s)

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in Diagnostic Radiology TTSH

Adj Asst Prof Ashutosh Prakash

Department of Diagnostic Radiology

Mission Statement

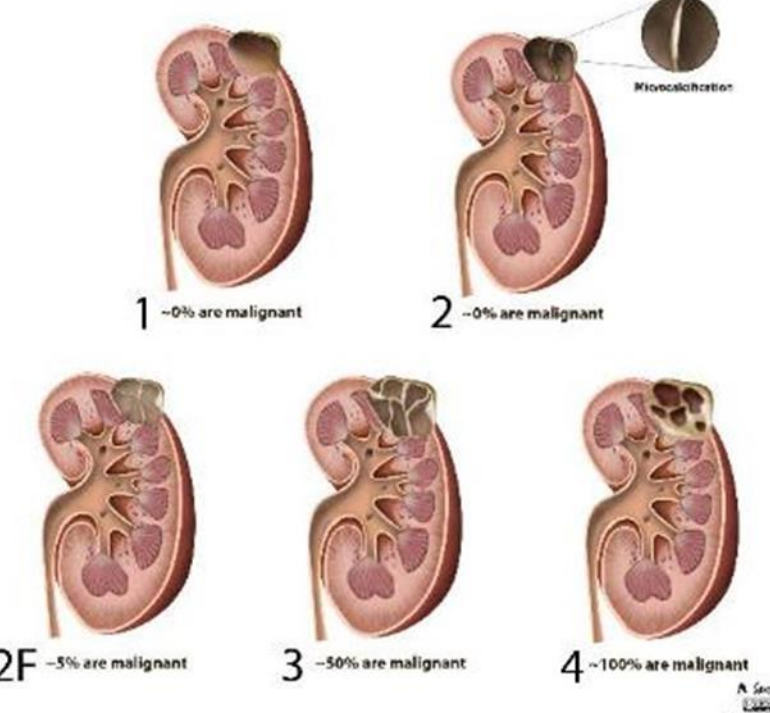
To increase appropriate referral of Contrast Enhanced Ultrasound (CEUS) in Diagnostic Radiology TTSH from 33% to >75% in 6 months

Team Members

| | Name | Designation | Department |
|---------------------|--------------------------------|------------------------|------------|
| Team Leader | Adj Asst Prof Ashutosh Prakash | Senior Consultant | Radiology |
| Team Members | Dr Ormasa Maria Constancia | Consultant | Radiology |
| | Dr Tan Teck Wei | Consultant | Urology |
| | Ms Jegatheeswari | Executive Asst | Radiology |
| | Ms Quijano Jocelyn Soriano | Principal Radiographer | Radiology |
| Sponsor | Adj A/Prof Gregory Kaw | HOD | Radiology |
| Facilitator | A/Prof Thomas Chee | | |

Evidence for a Problem Worth Solving

Bosniak Classification of Renal Cysts



CT Scan Guided Classification. Ultrasound usually the 1st modality. CEUS is an alternative to CT Kidneys.

"NOT ALL CYSTS NEED CT OR CEUS"

Based on total CEUS appointments given in May 2019: 46

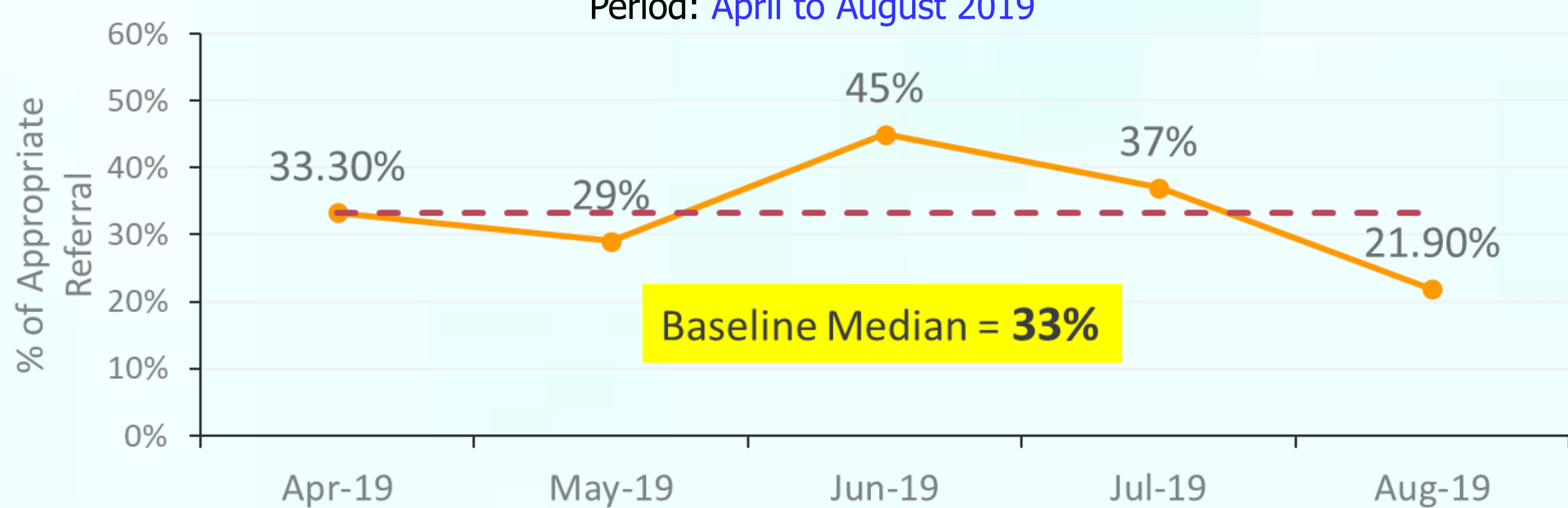
25 Investigations Done (24 kidney, 1 liver)

16 Cancelled by Radiologist

5 Patients did not turn up

Impact: Time slot and resources wasted and long patient appointment waiting time

% of Appropriate Contrast Enhanced Ultrasound (CEUS) Referral in Diagnostic Radiology TTSH
Period: April to August 2019

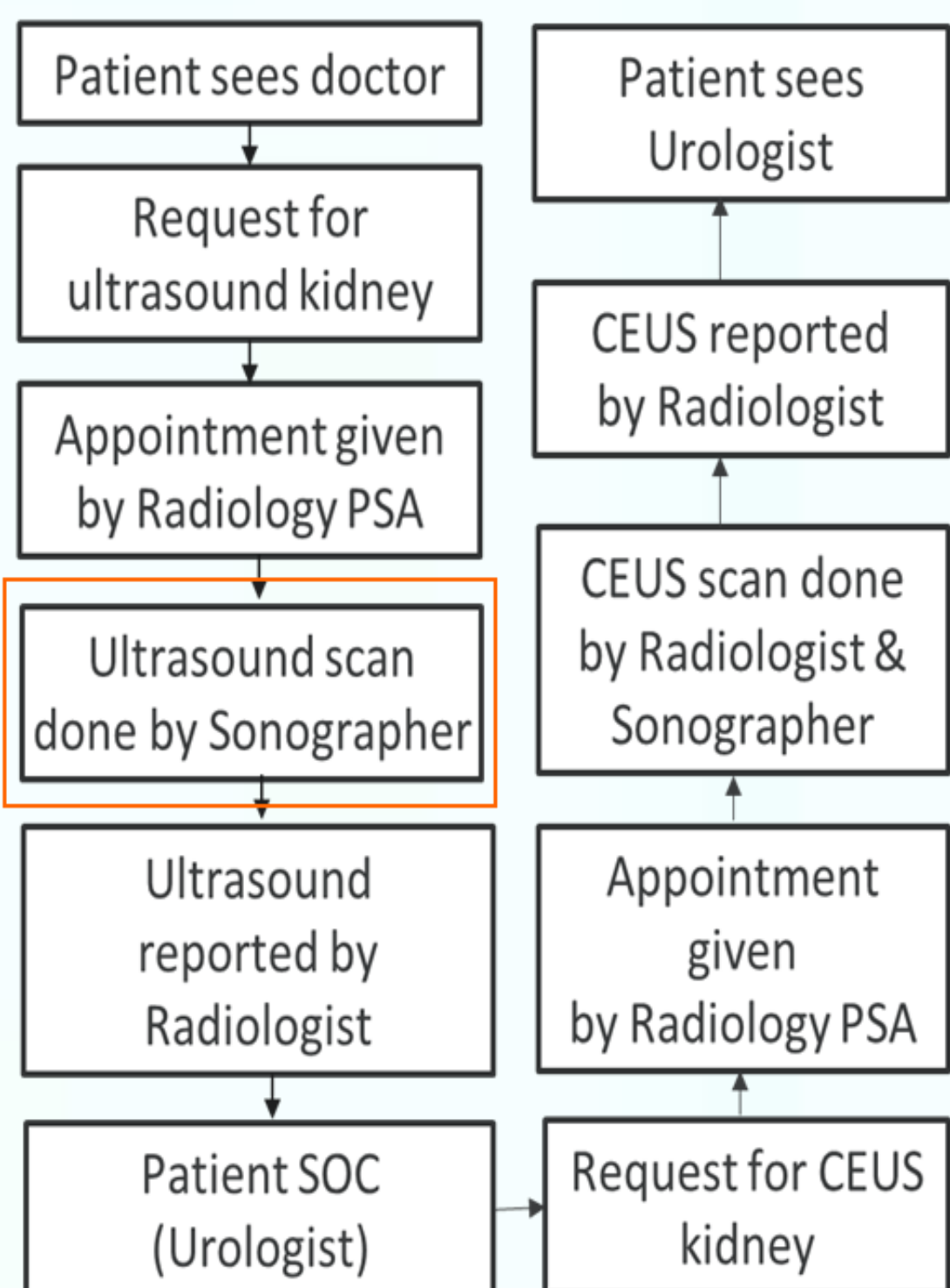


| Month | April | May | Jun | Jul | Aug |
|-----------------------------|-------|-----|-----|-----|-----|
| Total Appointments | 47 | 46 | 27 | 48 | 41 |
| No. of Patients who Turn Up | 42 | 41 | 20 | 35 | 32 |
| No. of Appropriate Referral | 14 | 12 | 9 | 14 | 7 |

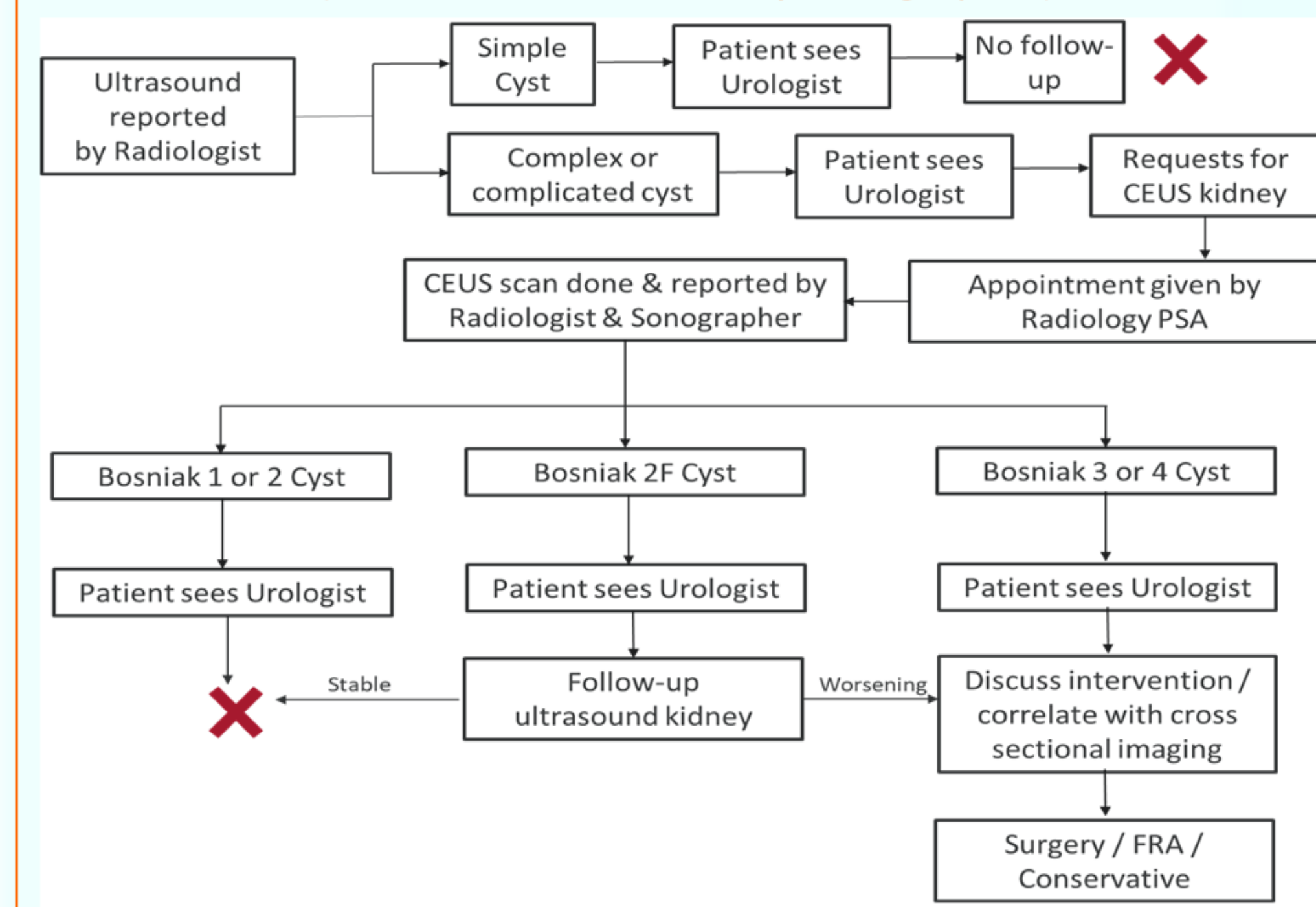
Note: Appointment wait time from April to August 2019: 8 weeks

Flow Chart of Process

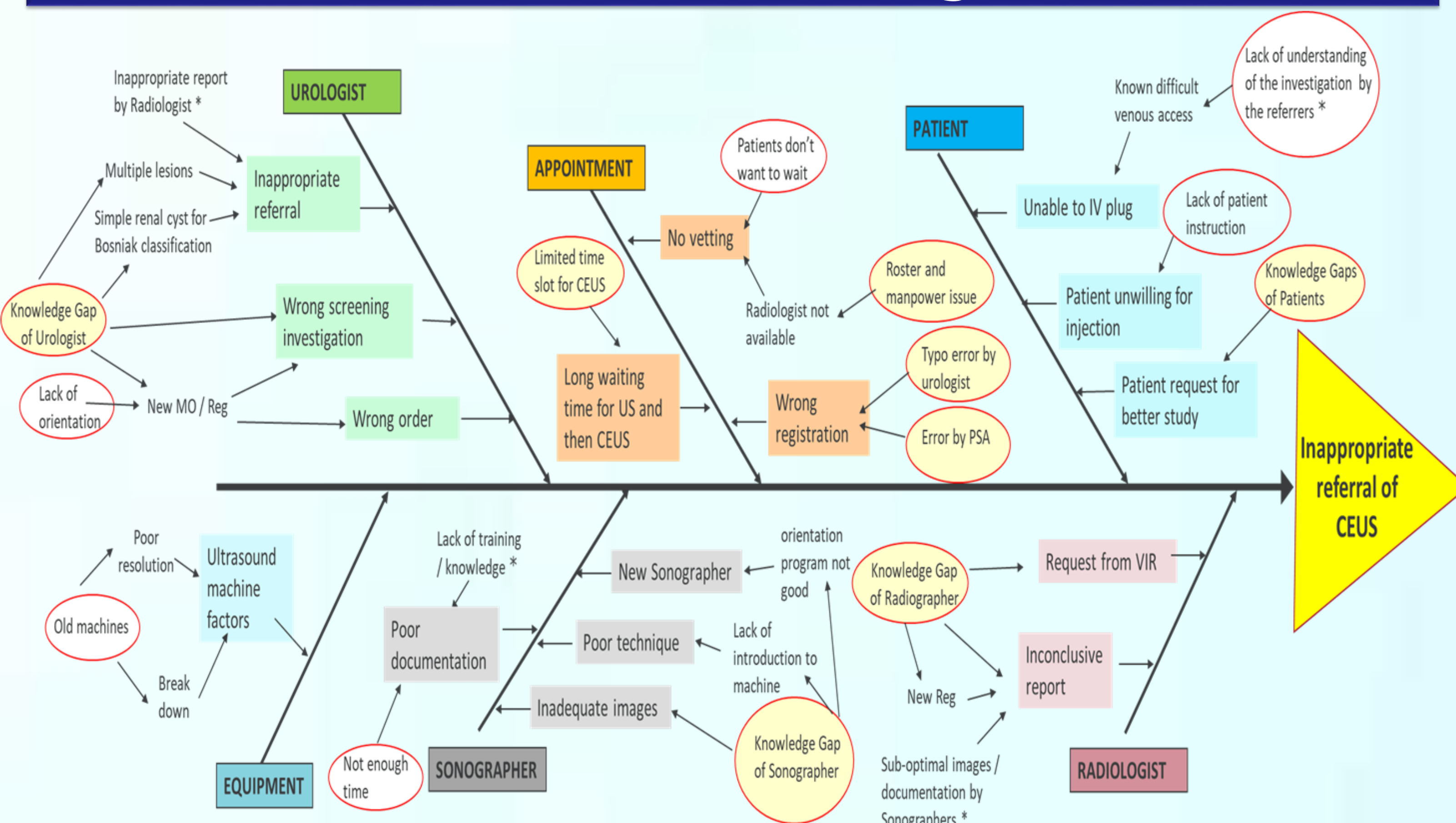
Macro Flow



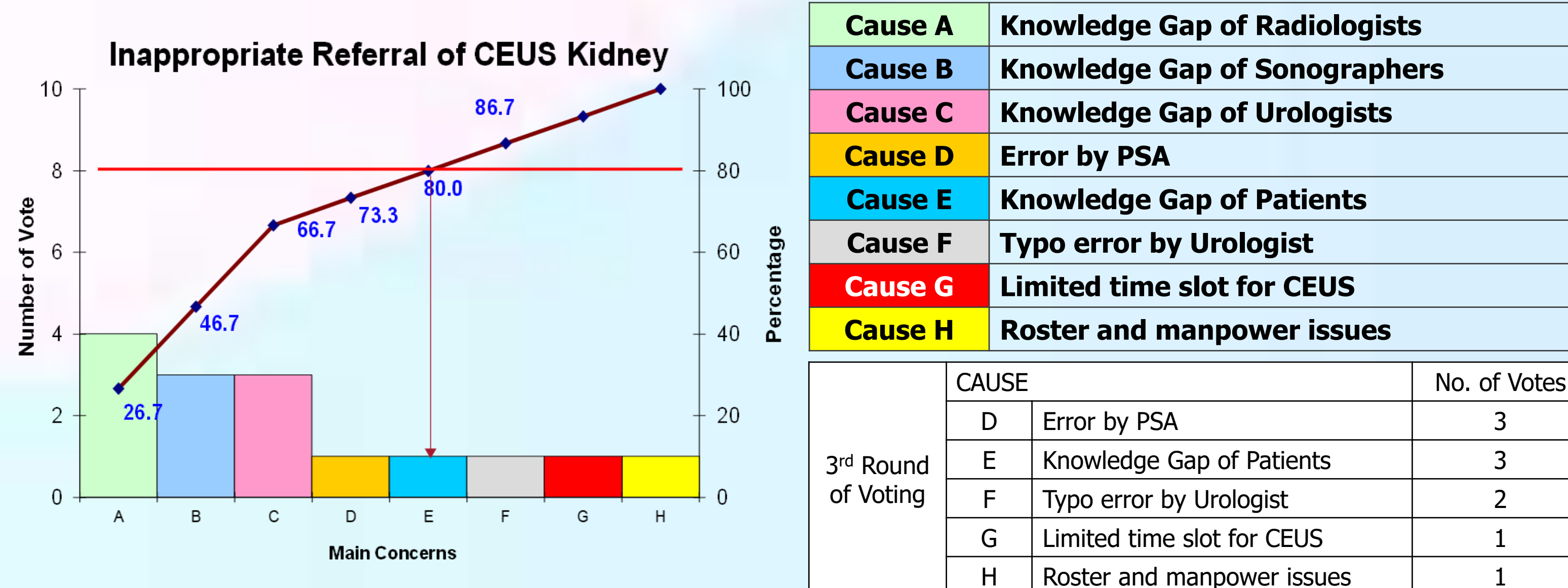
Micro Flow (Ultrasound scan done by Sonographer)



Cause and Effect Diagram



Pareto Chart

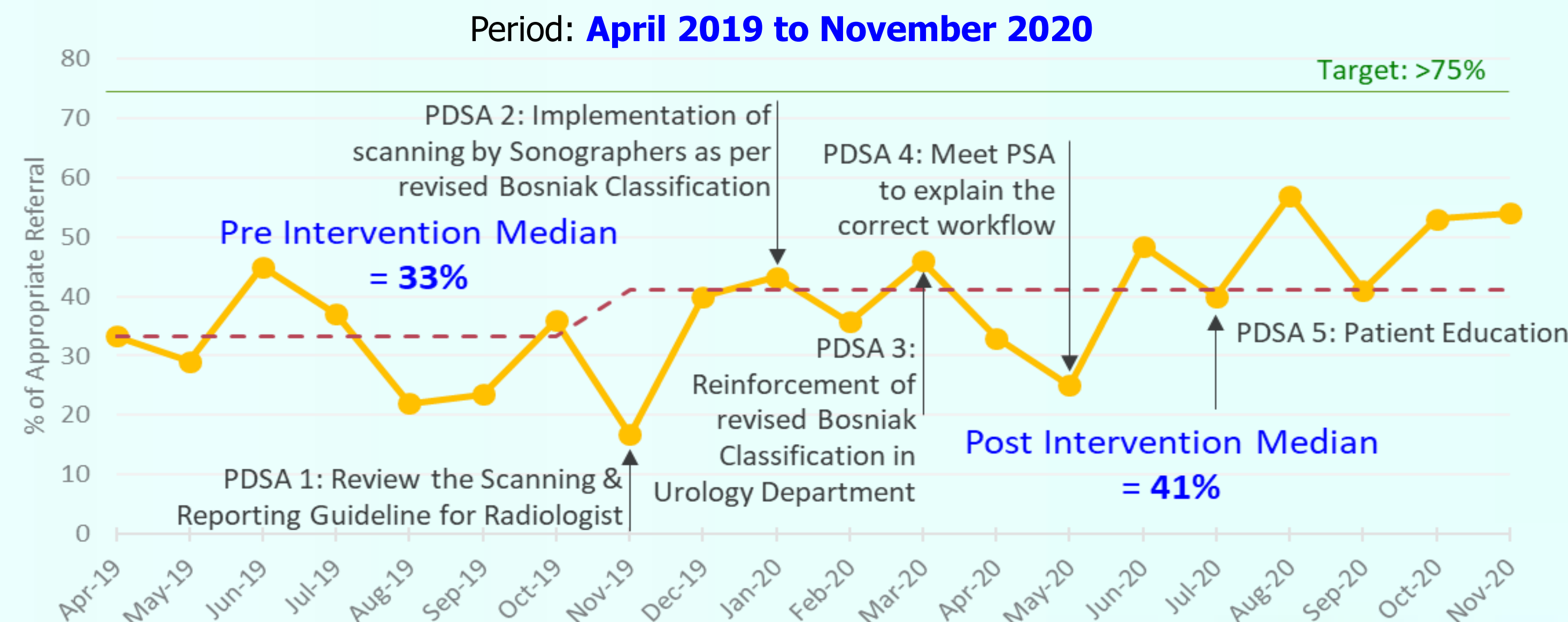


Implementation

| Root Cause | Intervention | Implementation Date |
|--|---|---------------------|
| Cause A: Knowledge Gap of Radiologists | PDSA 1: Review the Scanning & Reporting Guideline for Radiologists | 5 Nov 2019 |
| Cause B: Knowledge Gap of Sonographers | PDSA 2: Scanning as per revised Bosniak Classification for Sonographers | 5 Jan 2020 |
| Cause C: Knowledge Gap of Urologists | PDSA 3: Orientate Urologist and new Registrars / Medical Officers joining the Urology Department on the Revised Bosniak Classification. | 5 Mar 2020 |
| Cause D: Error by PSA | PDSA 4: Meet PSA to explain the correct workflow | 5 May 2020 |
| Cause E: Knowledge Gap of Patients | PDSA 5: Patient Education by Urologist using Patient Information Sheet | 5 Jul 2020 |

Results

Percentage of Appropriate Contrast Enhanced Ultrasound (CEUS) Referral in Diagnostic Radiology TTSH
Period: April 2019 to November 2020



| Month | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov |
|-----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Total Appointments | 47 | 46 | 27 | 45 | 41 | 38 | 43 | 35 | 33 | 44 | 38 | 36 | 28 | 20 | 44 | 23 | 22 | 34 | 32 | 29 |
| No. of Patients who Turn Up | 42 | 41 | 20 | 38 | 32 | 34 | 39 | 30 | 25 | 37 | 28 | 26 | 21 | 16 | 33 | 20 | 21 | 29 | 30 | 26 |
| No. of Appropriate Referral | 14 | 12 | 9 | 14 | 7 | 8 | 14 | 5 | 10 | 16 | 10 | 12 | 7 | 4 | 16 | 8 | 12 | 12 | 16 | 14 |

Note: There is NO appointment wait time for CEUS from August to November 2020

Cost Savings

| | Pre Intervention Period: Apr to Jun 2019 | Post Intervention Period: Sep to Nov 2020 |
|---|---|--|
| No. of non-indicated CEUS (average per month) | 8 | 1 |
| Total Cost Avoidance (Per Month) | | (8-1) x \$200 = \$1,400 |
| Total Cost Avoidance (Annualized) | | \$1400 x 12 = \$16,800 |

Note: Unit cost for CEUS = \$200

Lessons Learnt

1. Learnt the methodology and process for QI project
2. Team work
3. Everyone in the process must be convinced
4. It takes more than one session and different ways to convince
5. Difficult to change habits and mindset
6. Satisfying

Strategies to Sustain

1. Continue monitor patient waiting time for CEUS
2. Continue monitor percentage of appropriate referral
3. Audit ultrasound reports and CEUS referrals. Obtain feedback.
4. Re-inforce the guideline to new sonographers and Radiology / Urology Registrars and Medical Officers.
5. Share experience with other hospitals and clinics