

in Diagnostic Radiology TTSH

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Department of Diagnostic Radiology

Mission Statement

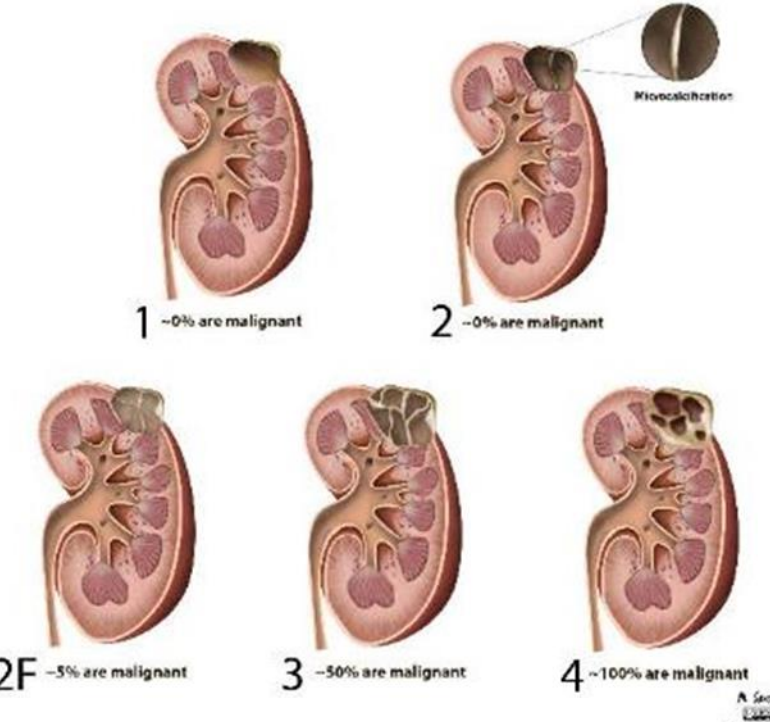
To increase appropriate referral of Contrast Enhanced Ultrasound (CEUS) in Diagnostic Radiology TTSH from 33% to >75% in 6 months

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

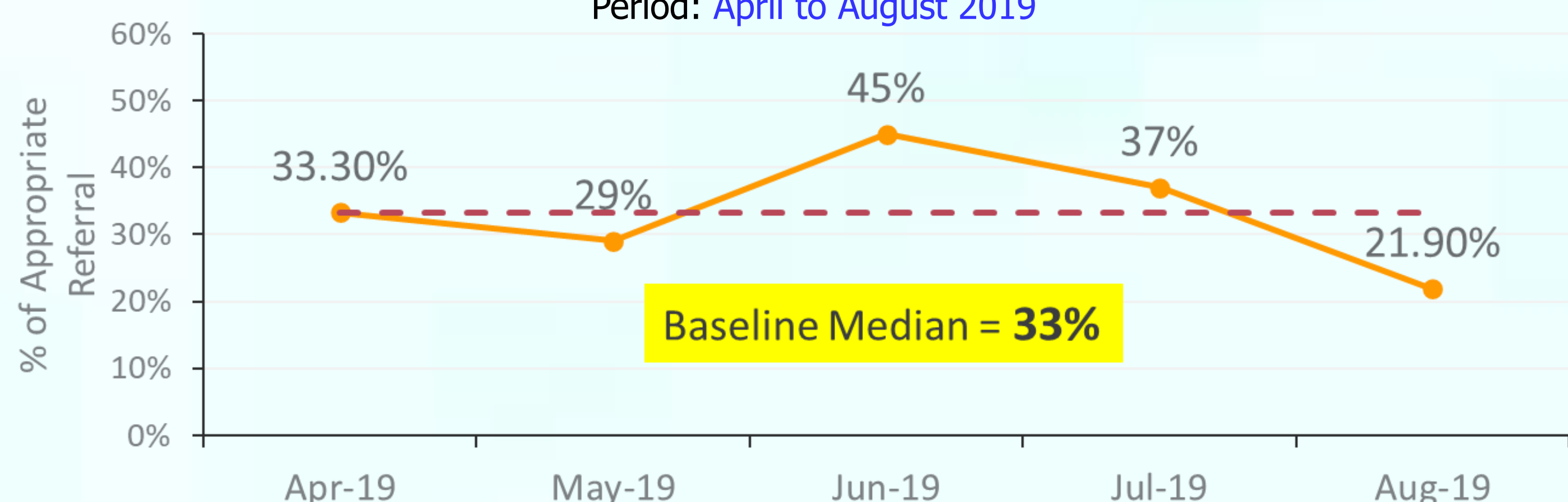
25 Investigations Done (24 kidney, 1 liver)

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

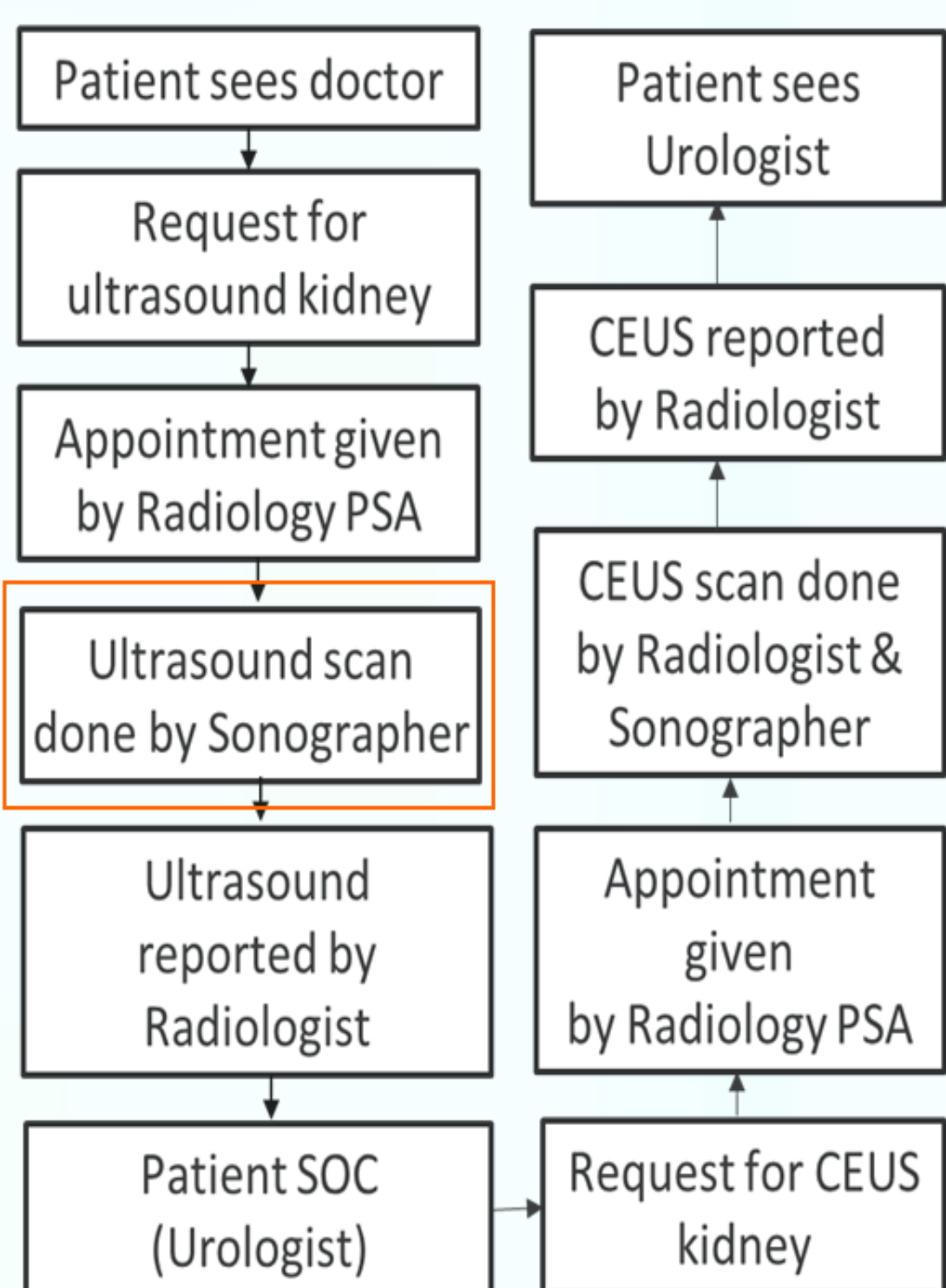


Month	April	May	Jun	Jul	Aug
Total Appointments	47	46	27	48	41
No. of Patients who Turn Up	42	41	20	35	32
No. of Appropriate Referral	14	12	9	14	7

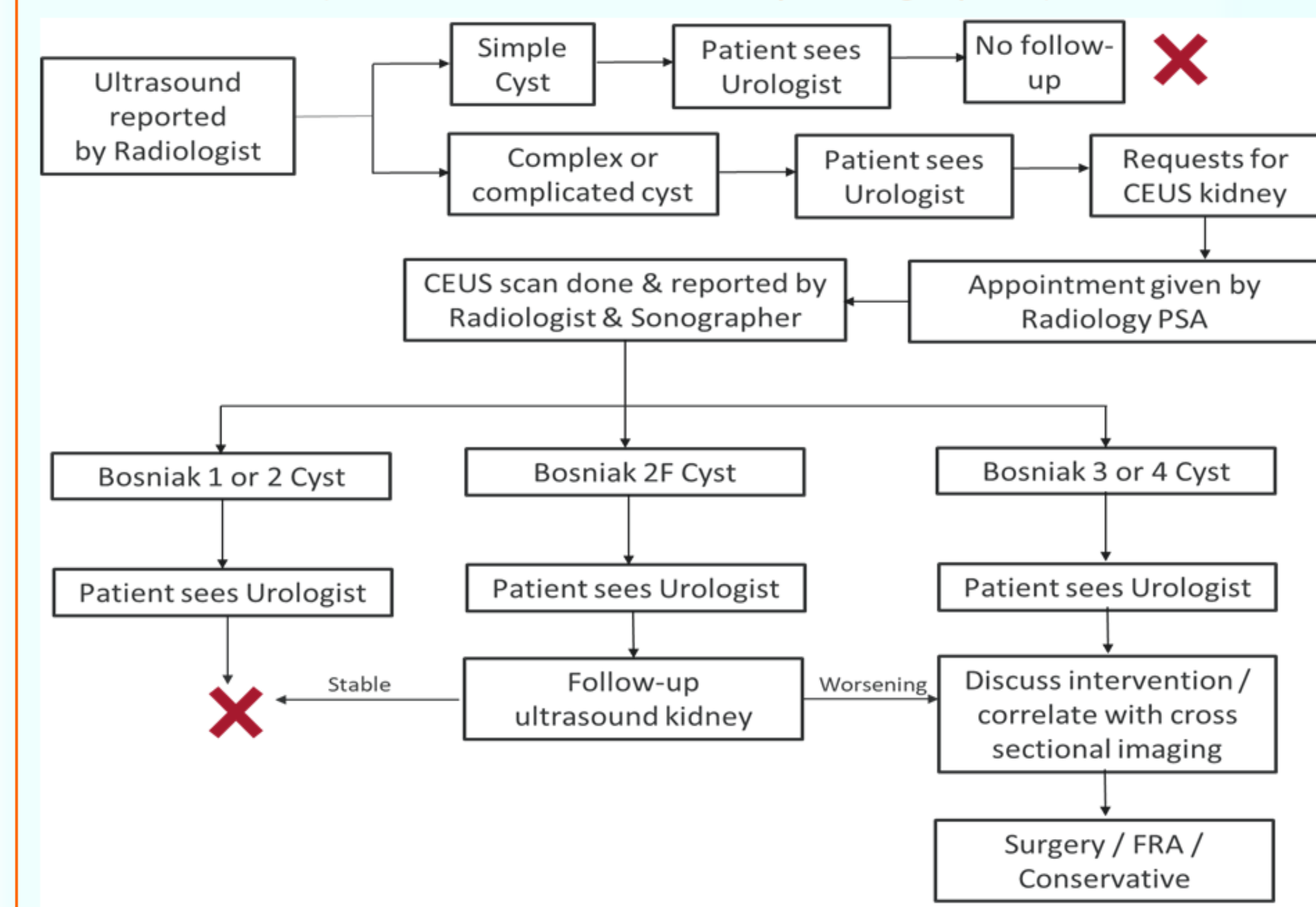
Note: Appointment wait time from April to August 2019: 8 weeks

Flow Chart of Process

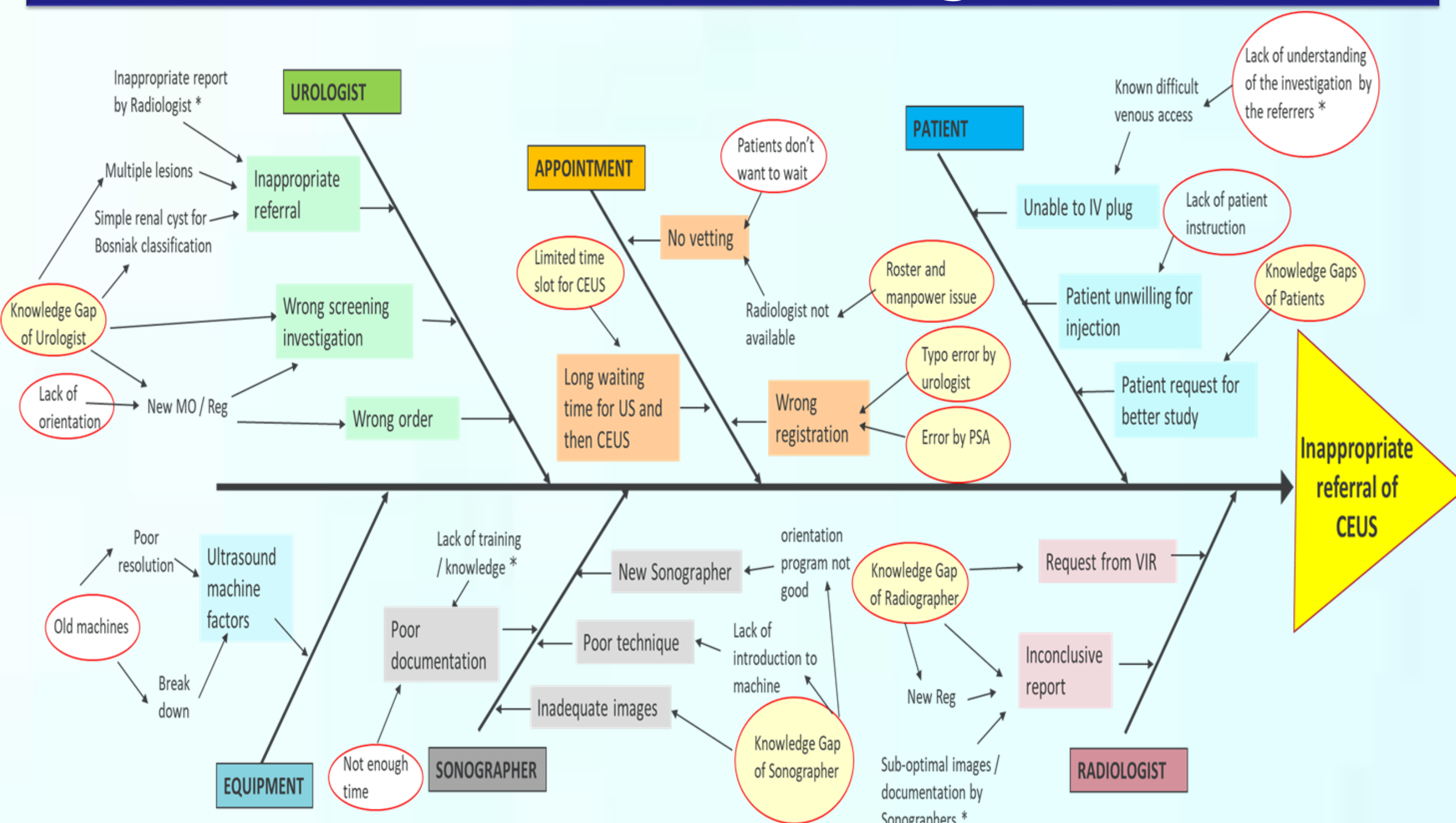
Macro Flow



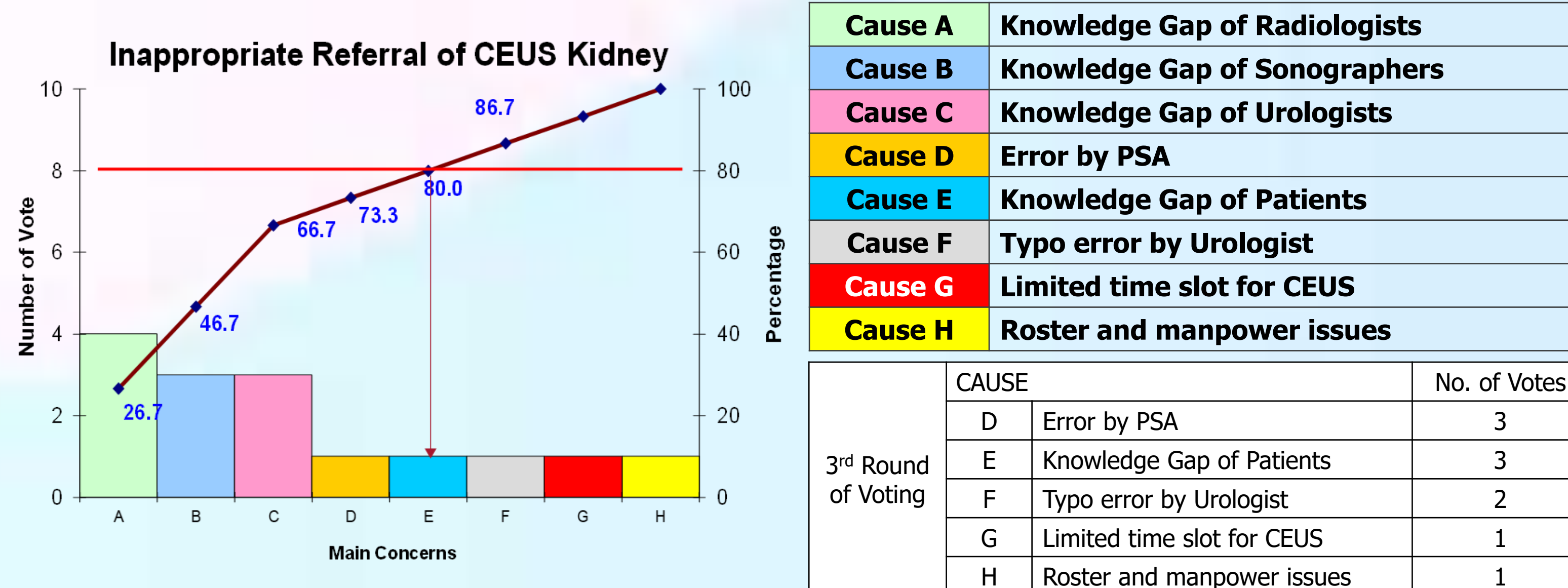
Micro Flow (Ultrasound scan done by Sonographer)



Cause and Effect Diagram



Pareto Chart

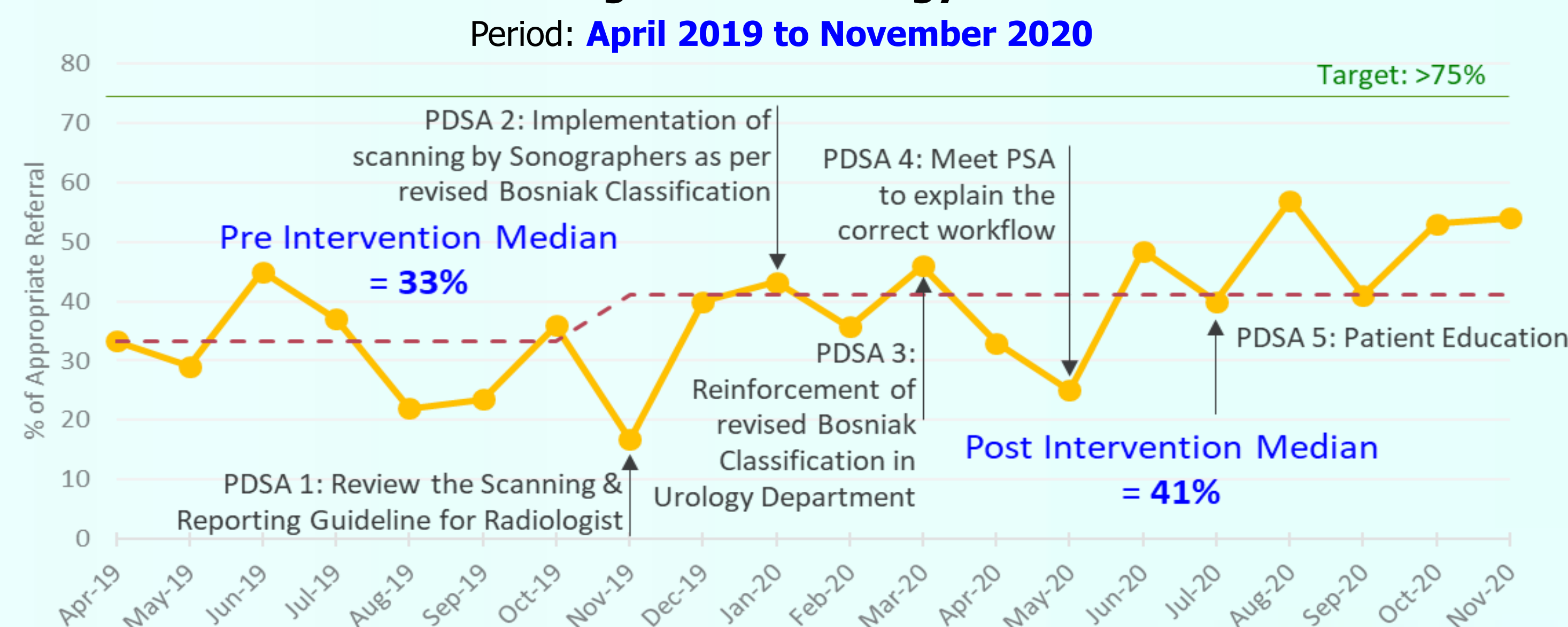


Implementation

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



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