

Timely Salvage Initiative: Reduce Time to Intervention for Patients Admitted for Malfunctioning Vascular Access (AVF)

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Mission Statement

To increase the proportion of inpatients who get fistula salvage within 48 hours from 0% to 50% (stretch goal 70%) over the next 6 months

Patients / Sites: All TTSH patients admitted for failing / thrombosed AV (arteriovenous) access

Measure: Time in hours from presentation time at Emergency Department → time to first of intervention [either in Interventional Radiology (IR) Suite / Invasive Cardiac Lab (ICL) / Operating Theatre (OT)]

Team Members

	Name	Designation	Department
Team Leaders	Dr Yong Enming	Consultant	General Surgery
	Dr Justin Kwan	Senior Consultant	Diagnostic Radiology
Team Members	Dr Zhang Li	Senior Resident Physician	General Surgery
	Ms Zhou Xueping	Senior Vascular Technologist	General Surgery
	Ms Diomampo Elah Katriz Abanto	Senior Staff Nurse	Operating Theatre
	Ms Joana Marie Eugenio Gray	Senior Radiographer	Radiography Service
	Ms Neo Shufen	Senior Coordinator	General Surgery

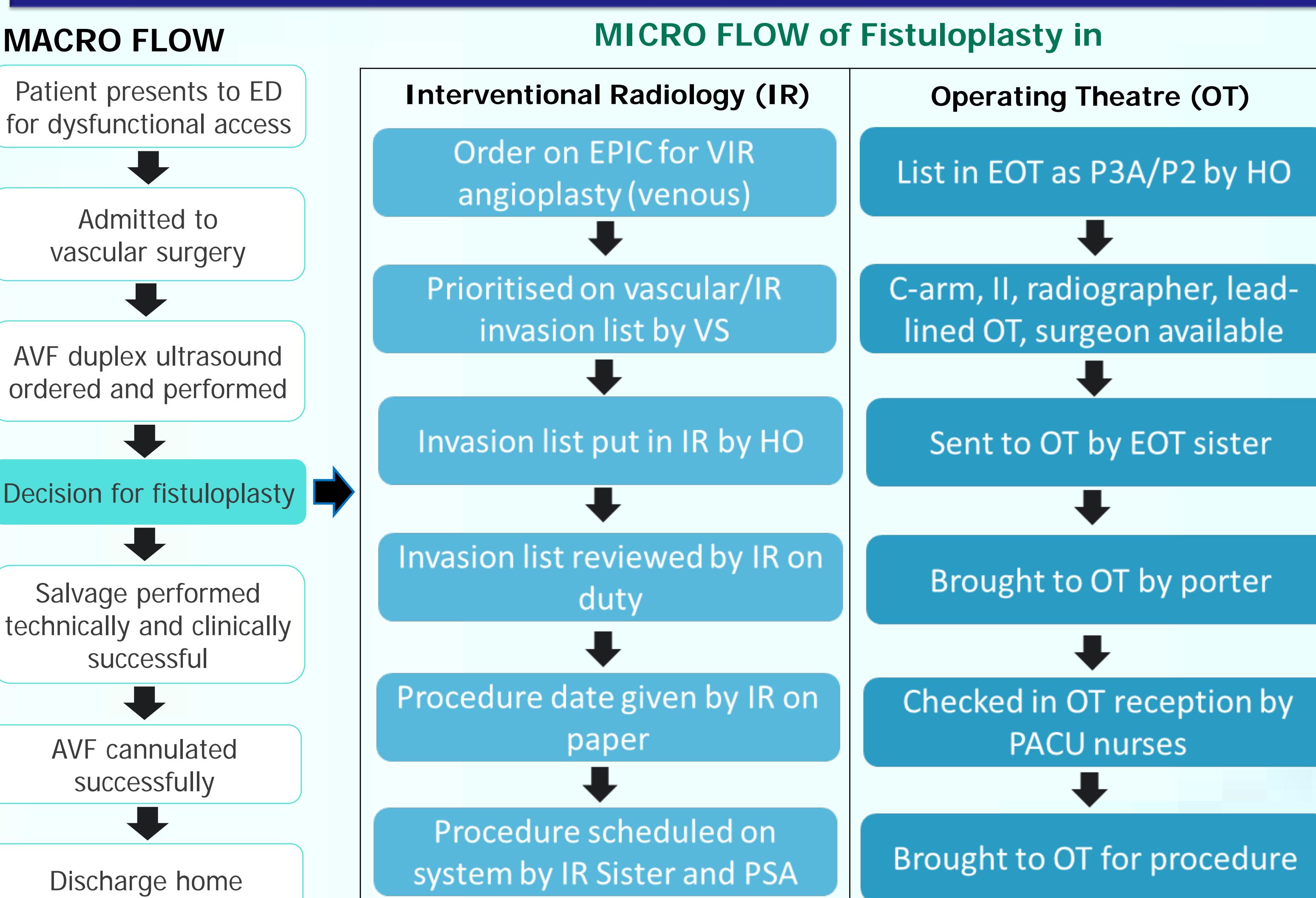
Sponsors:

- Adj A/Prof Glenn Tan Wei Leong (Head of Department, General Surgery)
- Adj A/Prof Pua Uei (Senior Consultant, Diagnostic Radiology)

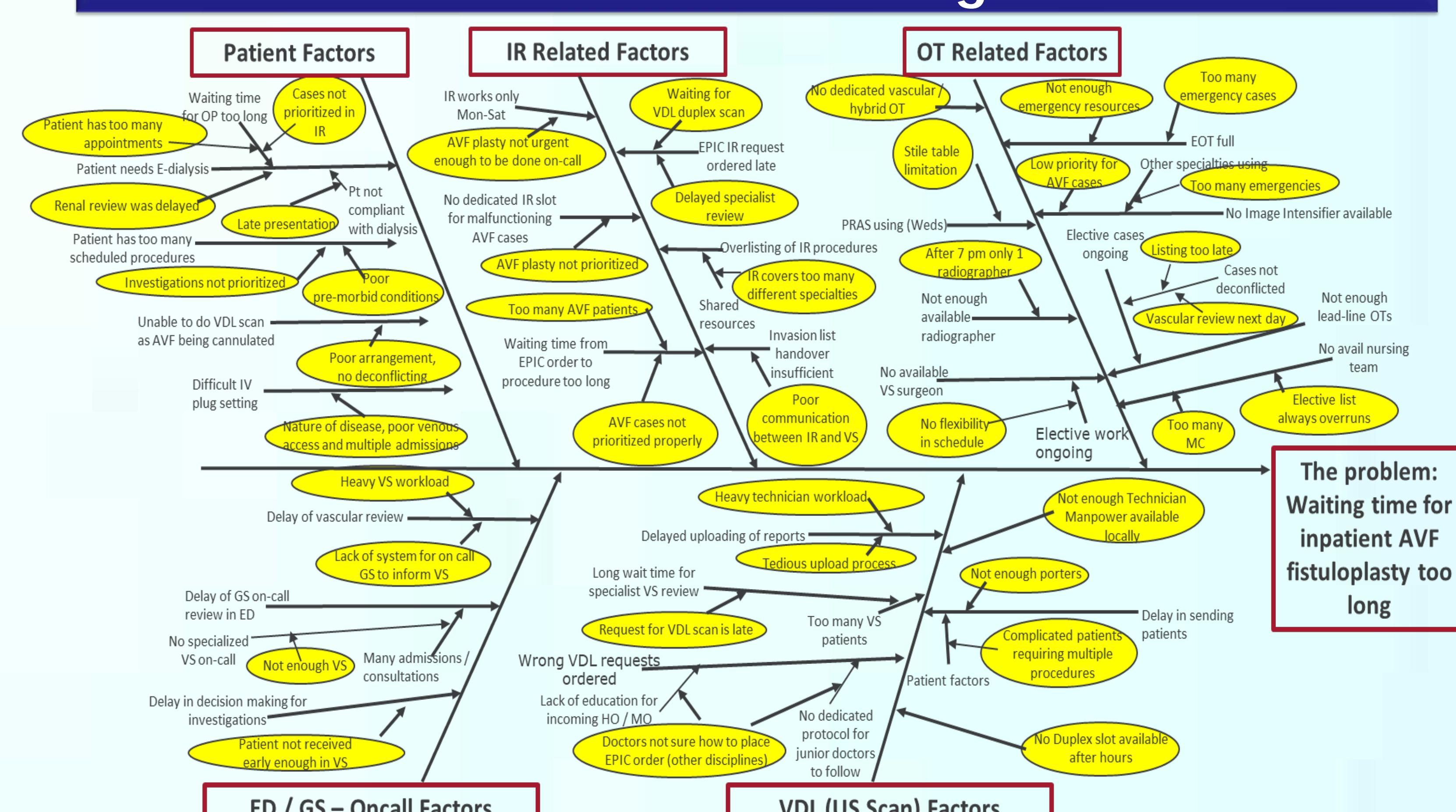
Evidence for a Problem Worth Solving

Literature	Extracted Contents	Impact of Delay
National Kidney Foundation (NKF) KDOQI Clinical Practice Guidelines (CPG) (Update 2019)	Thrombectomy should be performed in a timely fashion relative to event given the pathophysiology of the thrombotic process and inflammatory response. Early thrombectomy has better long term results in terms of primary assisted patency of the fistula circuit.	LESS NEED FOR TEMPORARY OR TUNNELED CVC INSERTION Early salvage minimises and eliminates the need for dialysis with temporary or permanent tunneled catheter ; less risk for associated complications: central vein stenosis or infection.
EBPG (European Best Practice Guidelines 2007) On Vascular Access	Fistula thrombosis should be treated as soon as possible or within 48 hours . The duration and site of AV fistula thrombosis as well as the type of access are important determinants of treatment outcome.	DELAY CAN MAKE INTERVENTION MORE CHALLENGING Delay in treatment may result in extension of the thrombus, making intervention or surgical procedures more difficult and less successful .

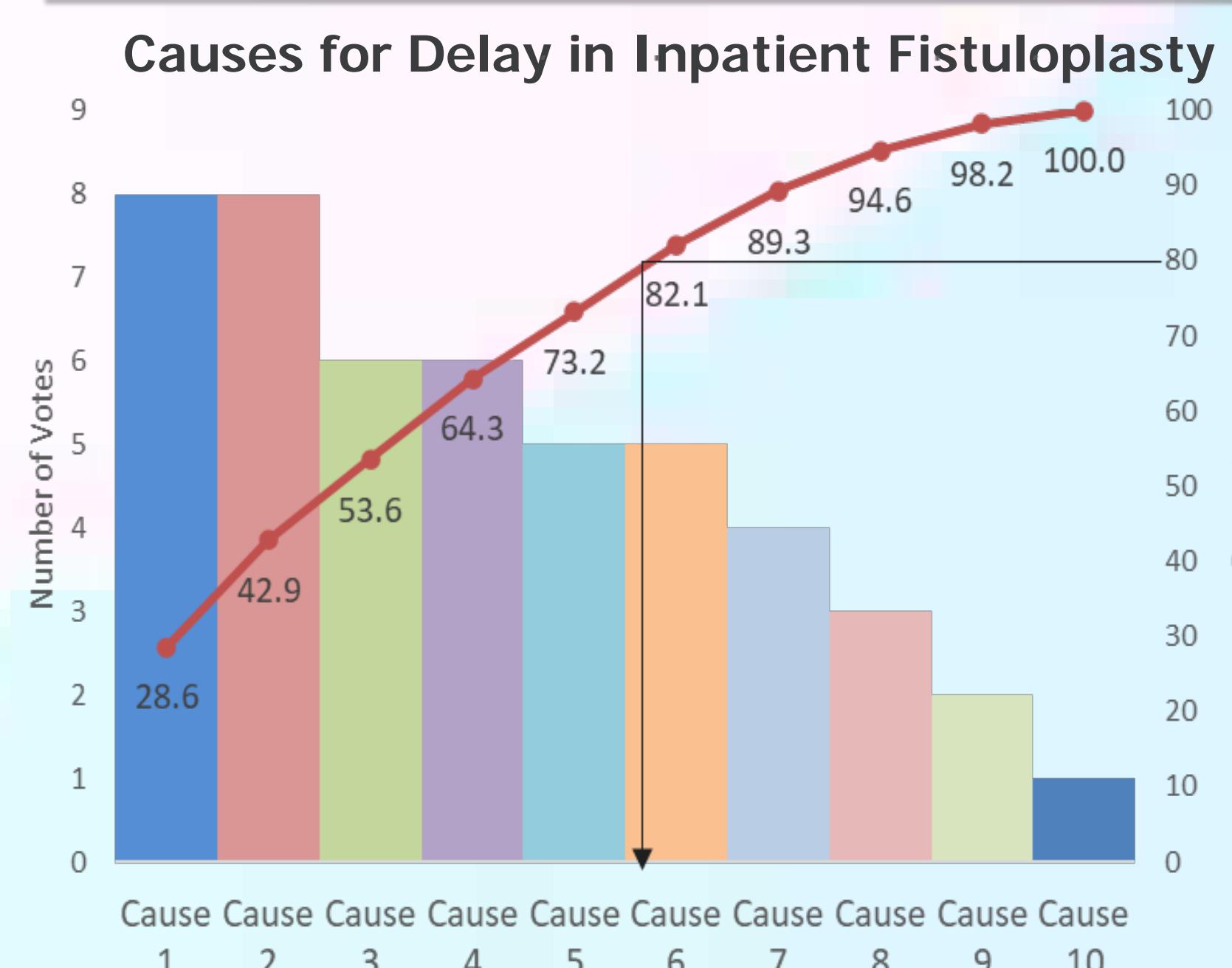
Flow Chart of Process



Cause and Effect Diagram



Pareto Chart

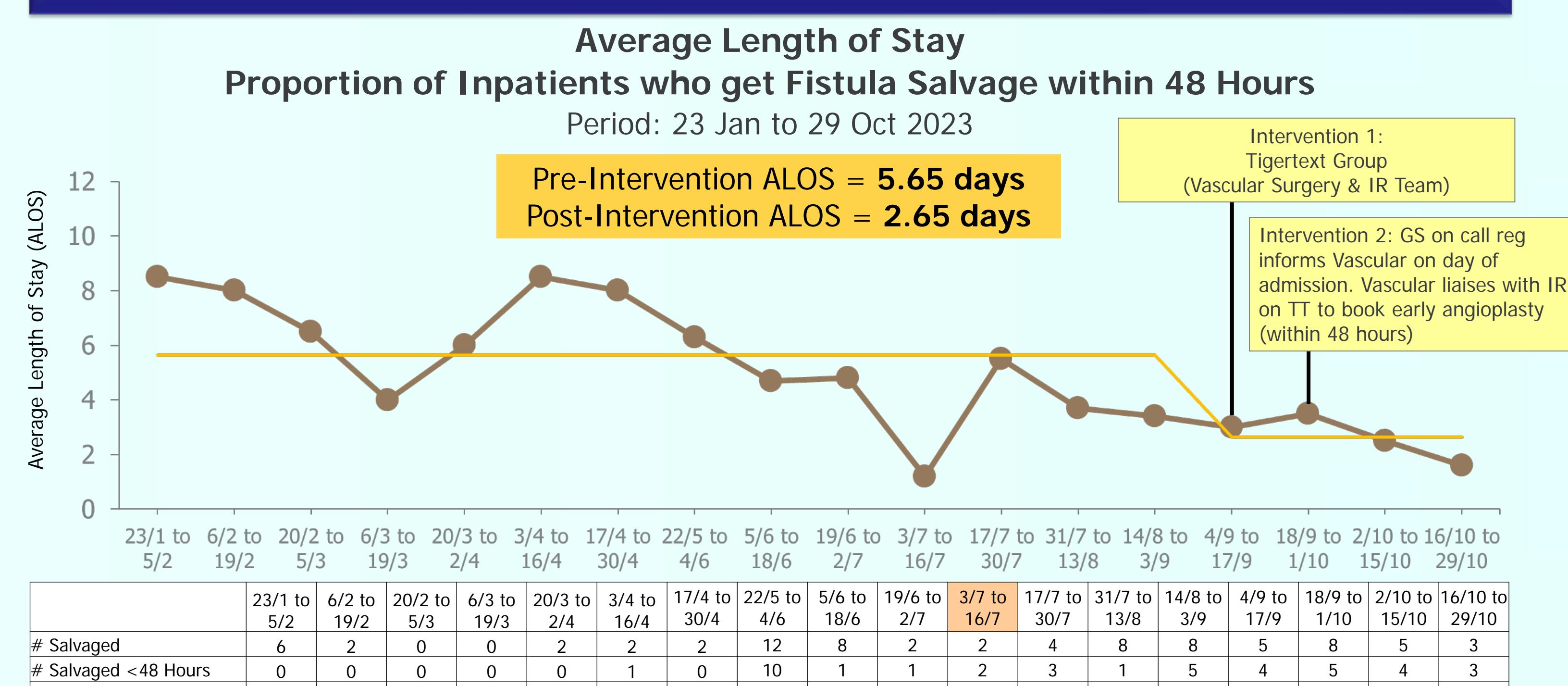


Causes
1 Cases not prioritised in IR
2 Lack of system for on call GS to inform Vascular Surgery (VS)
3 Poor communication between IR and VS
4 Low priority for AVF Salvage procedures in OT
5 Request for VDL scan is late
6 Patient not reviewed physically early by VS
7 Waiting time for outpatients too long
8 AVF cases not prioritised properly
9 Only 1 Radiographer after 6pm
10 Patients' investigations not prioritised

Implementation

Root Cause	Intervention	Implementation Date
Cause 1: Cases not prioritised in IR Cause 3: Poor communication between IR and VS (overlap but different causes)	TigerText (TT) / Teams group with Vascular Surgery, IR and IR sister to facilitate communication	4 Sep 2023
Cause 2: Lack of system for on call GS to inform VS Cause 6: Cases not reviewed early by IR	GS on call registrar informs Vascular on day of admission. Vascular liaises with IR on TT to book early angioplasty (within 48 hours)	18 Sep 2023

Results



Cost Savings

	Pre-Intervention	Post-Intervention
Average Length of Stay (Per Patient)	7 days*	2 days
Average Length of Stay Saved (Per Patient)	2 – 7 = -5 days	
Cost of Inpatient Stay (Per Patient)	= \$7,798	= \$2,228
FC insertion rate (Per Patient)	0.8	0.11
FC insertions reduced (Per Patient)	0.11 – 0.8 = -0.69 insertions	
Cost of FC insertion (Per Patient)	= \$340	\$47
Cost Savings (Per Patient)	\$2,228 - \$7,798 + \$47 - \$340	= -\$5863
Assume No. of Patients requiring AVF salvage per year = 151 (annualised as 64 required salvage over 22 weeks)		
Total Length of Stay Saved (Annualized)	-5 days x 151	= -755 days
Cost Savings (Annualized)	-\$5863 x 151	= -\$841,070

Note:

Unit Cost for Inpatient Stay Per Day Per Patient = \$1,114 & Unit Cost per Femoral catheter insertion per Patient = \$425
*Data from 2020: Lim C, Kwan J, Lo ZJ, et al. Single-centre experience with endovascular rotational thrombectomy for single session salvage of thrombosed arteriovenous fistulas and grafts. J Vasc Access. 2021 Nov 29

Problems Encountered

- Need to continue to work on solutions for patients coming in on Friday and the weekend (ie. weekend effect)

Strategies to Sustain

- New workflow
- Continue to implement the 2 interventions

Lessons Learnt

- Problem was not due to a lack of resources but due to a need to prioritise with IR
 - Able to do so by setting up TigerText/Teams group with IR and IR sister with Vascular
 - Invasion list workflow optimised
- Dysfunctional access patients only had decision on for intervention day after admission leading to delays
 - We brought decision forward by getting on call GS to inform vascular on call day of admission. This will be incorporated long term.