SERVICE EVALUATION OF FILTER LIFE DURING CONTINUOUS RENAL REPLACEMENT THERAPY (CRRT) USING HEPARIN AS ANTICOAGULANT.

DR. TORANJ WADIA, DR. QUEN MOK.

NHS
Great Ormond Street Hospital for Children
NHS Foundation Trust

Background and Aims: Heparin is currently the anticoagulant of choice for CRRT in PICU and ACT targets are taken as a marker of adequate anticoagulation[1,2]. Many PICU patients are coagulopathic secondary to their underlying disease process. The frequency of premature circuit/filter clotting (i.e. clotting before the manufacturer recommended maximum filter life) is high especially in the younger patients (neonates and babies weighing <10 kg)[2] despite either being coagulopathic or anticoagulated. Premature filter changes result in significant morbidity (increased blood product transfusions, fluid+/- inotrope resuscitation, prolonged ventilation and prolonged PICU stay). Alternative anticoagulants; citrate, bivalirudin, argatroban and prostacyclin may be better at maximising filter life[2]. Vascath site, mode of therapy, filtration fraction are the other factors influencing premature clotting[1]. We aim to evaluate our filter/circuit life with current practice prior to changing CRRT strategies to improve filter life.

Methods- Retrospective observational analysis of PICU patients needing CRRT based on review of electronic patient charts.

Factors analysed: Age at presentation, diagnosis, CRRT indication, vascath location, CRRT therapy mode, maximum filtration fraction, CRRT duration, number of filter/circuit changes per patient, circuit/filter change reason and vascath related complications.

March 2019 to December 2020
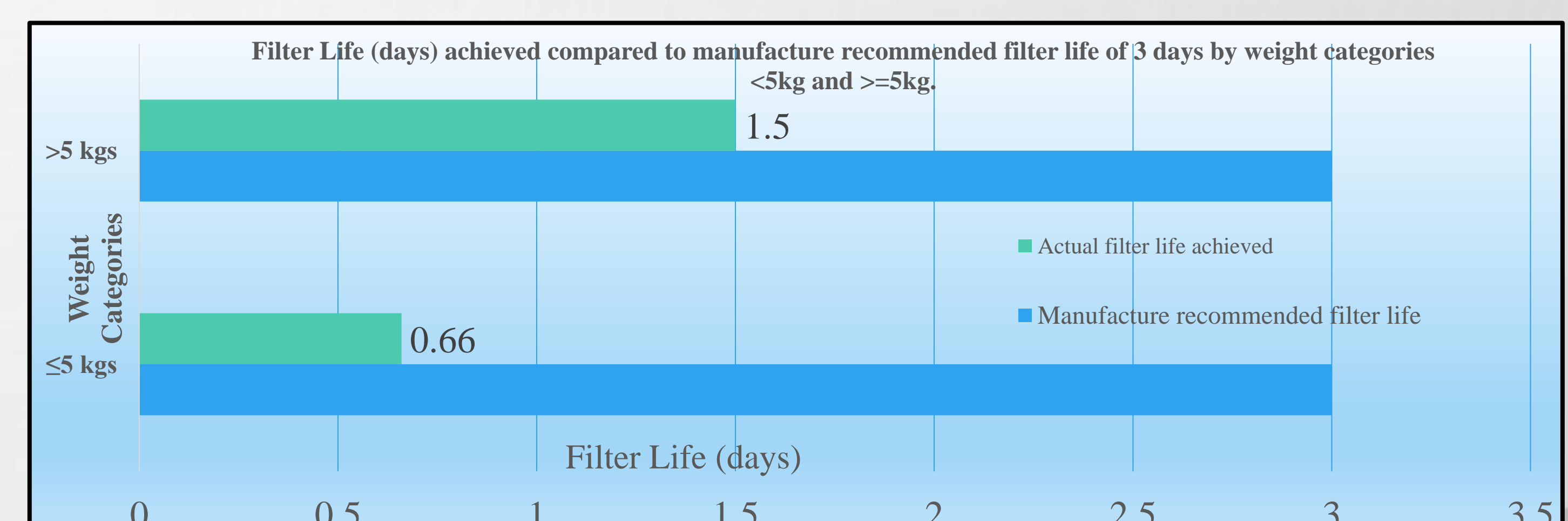
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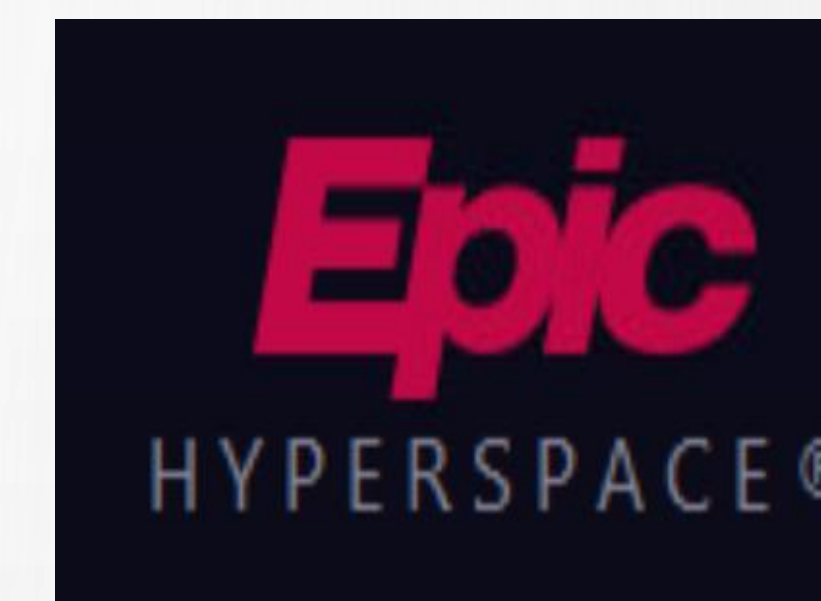
Outcome measures:

➤ Prevalence of Vascath related problems preventing effective CRRT necessitating vascath change.

➤ Comparison of the median filter life to the manufacture recommended filter life of 72 hours for the Aquarius filter/circuit.

➤ Time frame for premature filter clotting from start of CRRT run.

Results:

➤ 15 (60 %) were neonates.

➤ Lowest patient weight 2.8 kg.

23 patients

➤ Vascath related problems : 5 (21%) cases needed a vascath change because of inability to filter effectively with the first vascath.
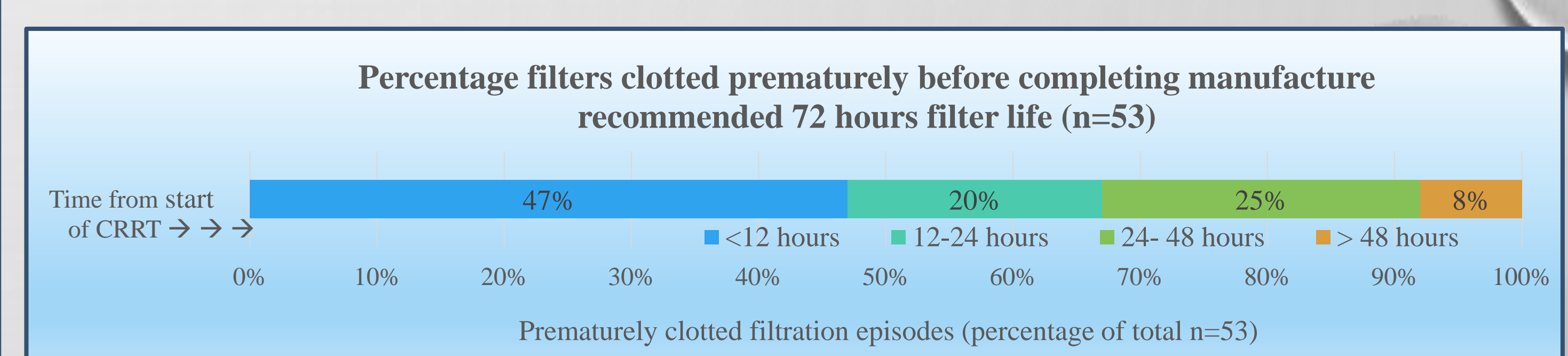
➤ Median duration of CRRT was 3 days (IQR 0-53 days).

➤ The median duration for which each filter in our study was used was 0.66 days (range 0-2.5 days) in children weighing ≤5kg and 1.5 days (range 0.75-3 days) in >5kg children.

Filter Life (days) achieved compared to manufacture recommended filter life of 3 days by weight categories <5kg and >=5kg.

➤ There were a total of 53 prematurely clotted filters/circuits of which 25(47%) clotted in <12hrs, 11(20%) in 12-24hrs, 13(25%) in 24-48hrs and 4(8%) after 48hrs.

Percentage filters clotted prematurely before completing manufacture recommended 72 hours filter life (n=53)

Patient/CRRT Characteristic		Number (n=23)
Median Age (months)		0 (IQR 0-51.5) 0 months = Neonates
Median Weight (kg)		3.76 (IQR 3.14-14.8)
Diagnosis	IEM	9 (39%)
	Sepsis	6 (26%)
	Haem-Oncology	5 (22%)
	Others (Primary Renal/ARDS)	3 (13%)
CRRT indications	AKI	11 (48%)
	Metabolite clearance	12 (52%)
Vascath Location (n=22)	Internal Jugular	13 (59%)
	Femoral	9 (41%)
	Subclavian	0
Median CRRT duration		3 days (IQR 0-53 days)
CRRT therapy mode	CVVH	9 (39%)
	CVVH+CVVHD/DF	14 (61%)
Max. Filtration Fraction used (% range)	10-20%	11 (48%)
	20-40%	12 (52%)

Conclusions-

➤ Vascath related complications necessitating vascath change/stopping CRRT occurred in 20% patients.

➤ Alternate filtration strategies are needed to prolong filter/circuit life especially in children <=5kg.

➤ Majority of the filters that clotted prematurely did so in the first 12 hours of starting CRRT (47%) suggesting potential benefit from early aggressive implementation of strategies to extend filter life.

References:
1. Baldwin I. Factors affecting circuit patency and filter 'life'. Contrib Nephrol. 2007;156:178-184.
2. Singh S. Anticoagulation during Renal Replacement Therapy. Indian J Crit Care Med. 2020 Apr;24(Suppl 3):S112-S116. doi: 10.5005/jp-journals-10071-23412. PMID: 32704216; PMCID: PMC7347059.