Effectiveness of a Quality Improvement Collaboration With Community Nurses to Reduce Hospital Referrals Due to Tunnelled Haemodialysis Catheter Dysfunction

HSD23

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INTRODUCTION

- Tunnelled haemodialysis catheter (THC) dysfunction is a major problem in end stage kidney failure patients, with 17-33% of THCs requiring removal.
- Thrombosis is a common cause of THC dysfunction which can be treated with a lytic dwell.
- In Singapore, the administration of a lytic dwell to

METHOD

Starting 1 Dec 2022, multifaceted QI interventions (FIGURE 1) were implemented in 41 community DCs over time. The interventions involved community dialysis nurses performing:
a) Optimising <u>B</u>lood flow, <u>L</u>ocking solution, <u>A</u>nticoagulant and <u>S</u>tandardising <u>T</u>echnique (BLAST)
b) <u>C</u>atheter flow restoration with <u>Lytic dwE</u>II at community di<u>A</u>lysis cent<u>R</u>e (CLEAR)

FIGURE 1. Driver Diagram of CLEAR & BLAST

Maintain patency and prolonging lifespan of THC

Optimise blood flow rates (QB) in patients with QB <300mL/min for early detection of THC dysfunction

- Adopt protocol of specific locking solution with anticoagulant effect e.g. sodium citrate, heparin
- Optimise anticoagulant dose during dialysis to prevent intra-luminal thrombus formation

restore the flow of occluded THC is traditionally performed in acute hospitals as an inpatient procedure, resulting in delay in dialysis, inconvenience to patients, increased hospital bed occupancy and overall healthcare costs.

OBJECTIVE

- Our study aims to reduce the number of referrals from the National Kidney Foundation (NKF) dialysis centres (DCs) to hospitals due to THC dysfunction by 30%, from a baseline mean of 48 referrals per month.
- To achieve this, our team reviewed the upstream process to prevent THC occlusion and empowered community dialysis nurses to treat catheter dysfunction by administering lytic dwells.



 A decision tree model (FIGURE 2) was constructed using TreeAge Pro 2024 to estimate the incremental costs associated with intervention (CLEAR) vs the usual care of all patients going to the hospitals.





FIGURE 3. BLAST & CLEAR C-Chart: No. of referrals from participating DCs to hospitals for THC blockage

Unblocking	New Locking	Use of different
of THC	Technique	Locking solution

Patient Stories



"Going to the hospital is difficult. It is inconvenient and not very comfortable as I need to ask people for help. I will also need to seek medical social worker for help if the bill is high. When I was told that the unblocking procedure can be done at the dialysis centre, I was happy."

- As of 31 March 2024, the number of patients referred to hospitals for THC dysfunction reduced from a baseline mean of 48 to 24 per month, reflecting a 50% improvement (FIGURE 3).
- During this study period, 100 community dialysis nurses had been trained and 219 cases of THC dysfunction were reported in participating community DCs.
- Community dialysis nurses performed lytic dwells in 143 cases that fulfilled the eligibility criteria while the remaining patients were referred to the hospitals for treatment. THC flow restoration was successfully performed in the community for 125 (87.4%) cases, translating to at least 300 bed days saved.
- There were no reported catheter-related infections in patients who underwent treatment. The treatments were well received by our patients with an average patient feedback score of 4.6/5 per month.
- Cost analysis results demonstrated a cost-saving of S\$258,038 for every 100 patients treated in the community and the probabilistic sensitivity analysis (PSA) indicates that the probability of the



FIGURE 4. BLAST C-Chart: No. of patients with occluded THC presenting at all participating DCs



TABLE 1. Cost analysis results comparing Intervention (I) and Usual Care (C) for a simulated cohort of 100 patients at a typical hospital

	Average cost (95% CI)	Incremental Cost (95% CI)	PSA
Ι	S\$207,705 (166,102 to 253,634)	-S\$258,038	
			>99%

Mr Abdul Salam

Our first patient to receive successful restoration of his THC in the community on 31 Dec 2022

"I really appreciate that NKF nurses can perform THC unblocking procedure for me when I have a blocked catheter. It saves me time having to go to the Emergency Department and this is a big help for me in reducing my financial burden. The nurses are my life savers."

Mr Ng Hock Chye had multiple co-morbidities with frequent admissions & had successful restoration of his THC on 14 Oct 2023

Staff Story



"This unblocking procedure was something we have wished to be able to do for our patients at the centre for a long time as previously patients had to be directed to ED. I feel good about the procedure and it is something worthwhile and significant I can do to avert an admission."

Sister Sivamani Anandam



intervention being cost saving is >99% (TABLE 1).



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Nurse manager cleared the 1st occluded THC in NKF on 31 Dec 2022, together with Sister Lucy Lu

CONCLUSIONS

- Our study illustrated the importance of reviewing existing process for continuous improvement and empowering nurses in the community to practice at the top of their licenses.
- Transition away from a predominantly inpatient care is essential to improve patient outcomes and reduce the burden on our healthcare system.
- Bringing together individuals with a shared common vision, catalysed by our National DM collaborative, ensured the availability of essential resources at the opportune moment.

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ACKNOWLEDGEMENTS

We acknowledge Senanayake Sameera Jayan and Nicholas Graves, Duke-NUS Medical School for their valuable contribution in supporting our cost analysis.

We also extend our sincere gratitude to the National Improvement Unit, MOHT for funding this project that made our work possible.

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