



# Improving drainage of Continuous Renal Replacement Therapy effluent bag in Sengkang General Hospital Intensive Care Unit

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## Background

Continuous Renal Replacement Therapy (CRRT) is commonly used to provide renal support in intensive care unit (ICU) for critically ill patients with acute kidney injury, particularly those with hemodynamic instability. CRRT removes water and waste at a consistent rate, and drains the waste product into a 5 liters effluent bag. These effluent bags are changed frequently by nurses approximately 1.5 to 3 hourly, depending on the treatment order. Nurses are required to hand-carry these heavy bags approximately 30 metres from patient rooms to Dirty Utility (DU) and drains them into a designated basin before discarding the empty effluent bags into the general waste bin. It takes an average of 5 minutes 34 seconds for an effluent bag to be emptied. This practice is time consuming and physically tiring for ICU staff.

In addition, the design of the DU basin leads to high incidence of effluent bags falling onto the ground. Spillage and splattering of body fluid onto nearby walls, cupboards and macerators create additional work for housekeeping staff. This also increases risk of splash injury and body fluid spillage for nurses and housekeepers.

## Goals / Targets

- To reduce time taken to drain effluent bag by 80%.
- To achieve zero reported complaints from housekeepers about effluent spillage in DU.

## Root Cause Analysis (RCA)

RCA was conducted and the factors below were identified

- The effluent bag disposal process is time-consuming (Table 1) and tedious for nurses.



**Floor Map 1:** Routes of a nurse walking from nearest and furthest patient's room to DU

**Table 1:** Time-motion study on disposal of effluent bag

Description of processes	Time taken				
	1 <sup>st</sup> reading	2 <sup>nd</sup> reading	3 <sup>rd</sup> reading	4 <sup>th</sup> reading	Average
Nurse walks from patient's room to DU	45s	59s	1min 14s	1min 39s	1min 9s
Nurse drains full effluent bag	3min 50s	3min 50s	3min 50s	3min 50s	3min 50s
Nurse walks from DU to patient's room	25s	20s	48s	47s	35s

- The designated sink at DU is not designed to hold the effluent bag during drainage, which allows the bag to fall and cause body fluid spillage on the floor.
- Housekeepers have reported that effluent bags had fallen and spilled contents at least 8 out of 10 times.



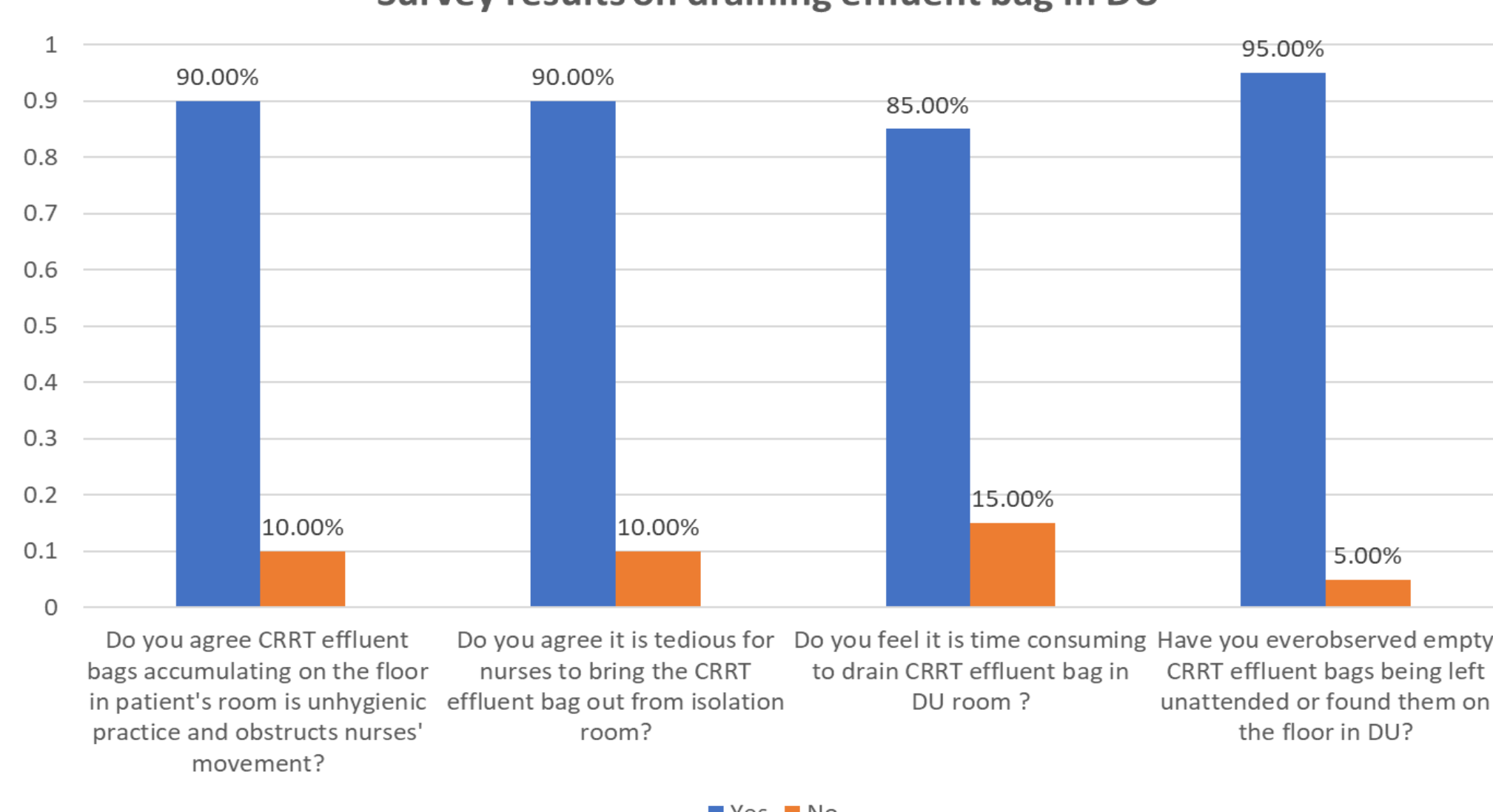
**Picture 1:** Effluent bag placed at side of sink.



**Picture 2:** Spillage of effluent bag on floor

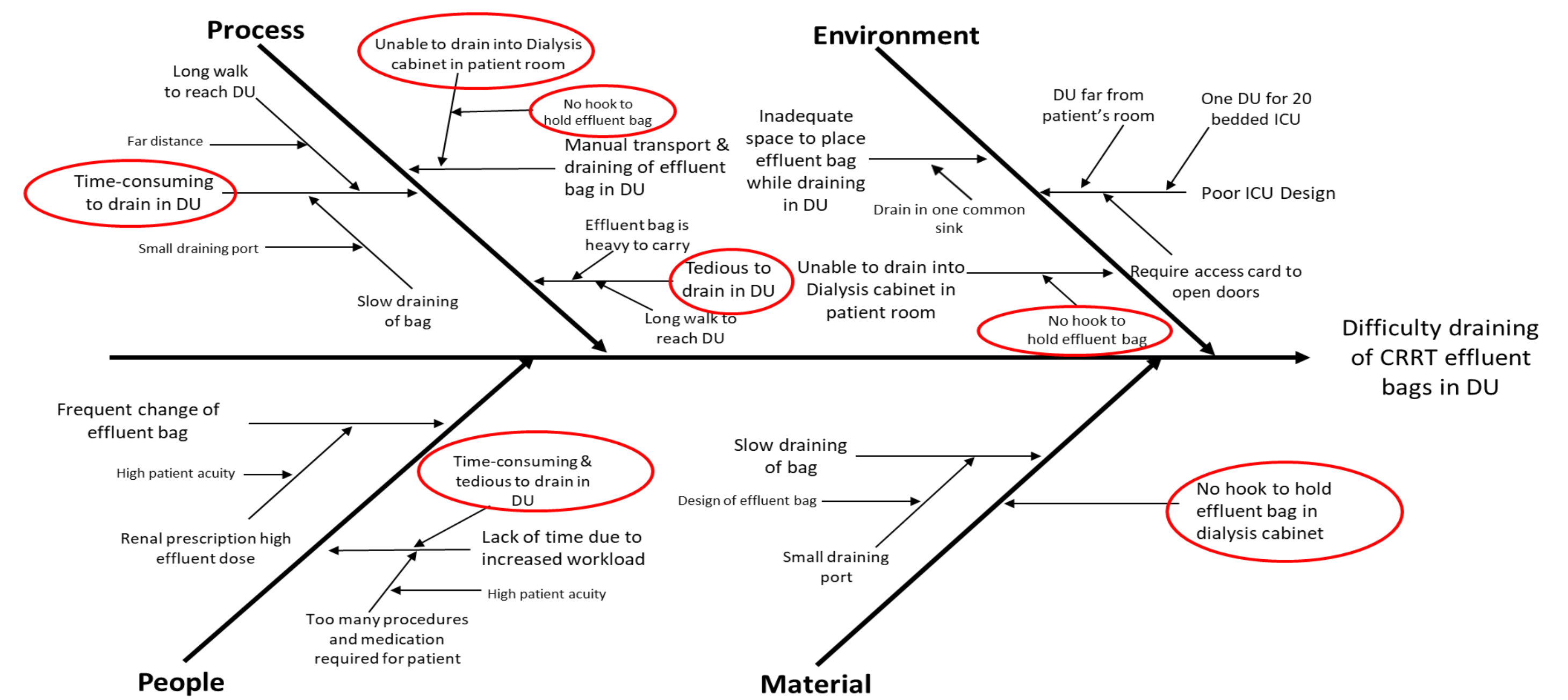
Survey was also conducted to understand staff perceptions of existing workflow. 95% of staff felt effluent bags left unattended in DU pose a safety hazard to healthcare workers. Majority also felt accumulating effluent bags in patients' rooms is unhygienic and obstructs movements.

**Survey results on draining effluent bag in DU**



Discussion on how to streamline and enhance work process of draining effluent bags for CRRT was carried out. Draining effluent bags inside dialysis cabinet in individual patient rooms was found to be the most feasible solution.

## Root Cause Analysis with Fishbone Diagram



## Interventions / Initiatives

Various methods of draining effluent bag inside dialysis cabinet were trialed and evaluated.

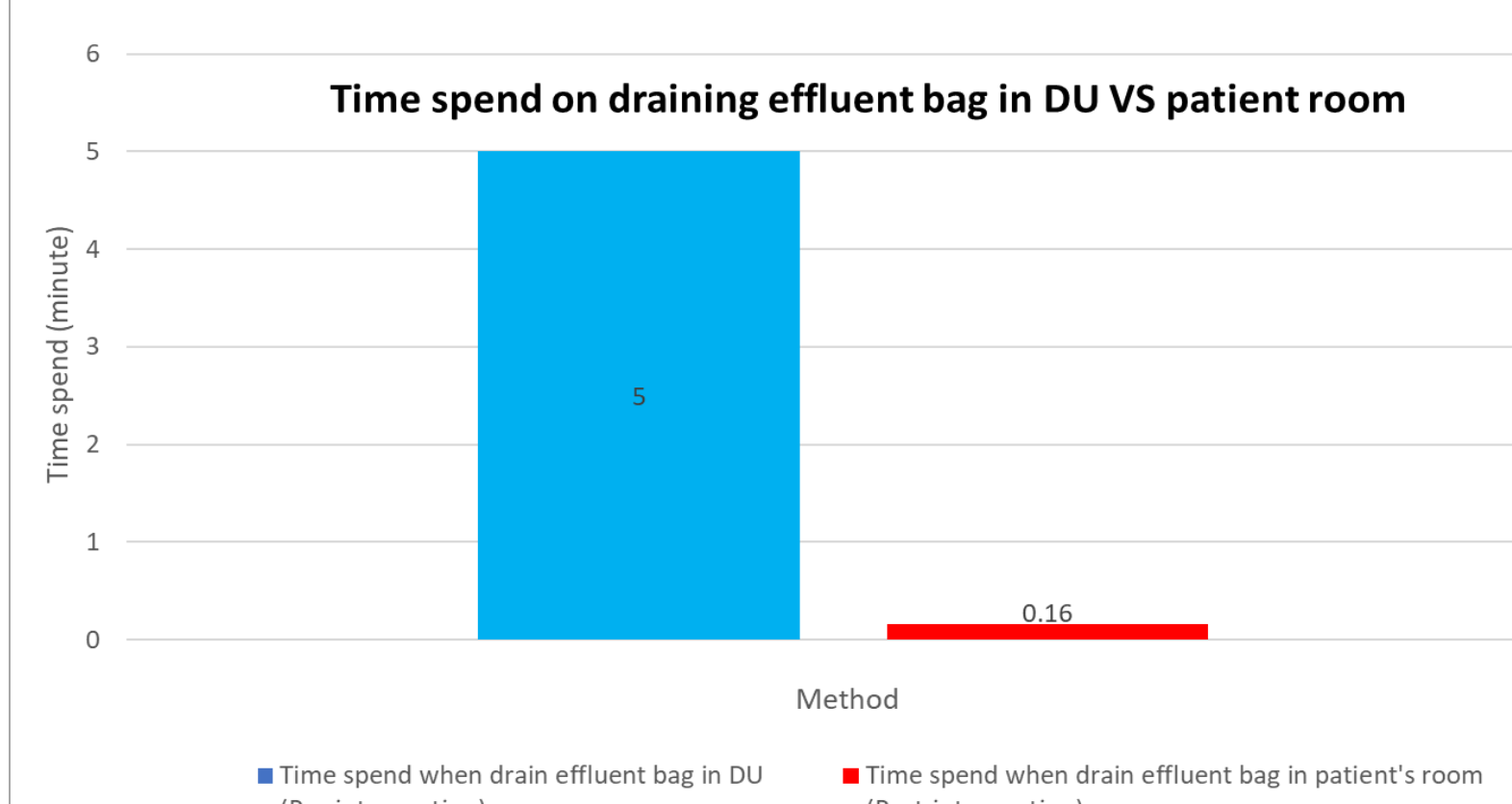
Model A	Model B	Model C
<ul style="list-style-type: none"> <li>Effluent bag was hung on dialysis cabinet door with S-hook.</li> <li>Suction tubing and straight connector were connected to bag and directed into drainage pipe for draining.</li> <li>Unnecessary use of ward consumables and wastage.</li> <li>Prolonged hanging of heavy effluent bag potentially damages dialysis cabinet door.</li> <li>Additional time taken to retrieve consumables.</li> <li>Missing S-hooks.</li> </ul>	<ul style="list-style-type: none"> <li>Effluent bag was hung on adjustable rod with 2 S-hooks.</li> <li>Rods and S-hooks were missing or inadequate.</li> <li>Staff had to be trained to install rod.</li> <li>Rod not able to withstand heavy weight for a long period.</li> <li>Additional time taken to retrieve consumables.</li> </ul>	<ul style="list-style-type: none"> <li>Installation of permanent hanger in each ICU dialysis cabinet to hang effluent bag</li> <li>Readily accessible.</li> <li>Shorter time taken to drain out fluid into drainage pipe.</li> <li>Less spillage incidents and exposure risk to body fluid spillages.</li> </ul>

## Implementation Plan

Implementation Plan	Responsible	Date
Discussion on Problem identified and Root Cause Analysis	All team members	1 July 2021
Implementation of trial interventions in ICU setting	All team members	1 August – 31 December 2021
Survey of draining CRRT effluent bag in ICU	All ICU nurses	1 January 2022
Installation of permanent hanger in all the ICU isolation rooms	All team members	March 2022

## Results / Follow up

Among the various methods of draining effluent bag in dialysis cabinet, installing permanent hanger was found to be the most effective and time-saving method (time was reduced by 96% post-intervention) and it was piloted in ICU isolation rooms.



Method	Time
Pre-intervention	5 mins
Post-intervention	10 secs
<b>Time saved</b>	<b>4 mins 50 secs</b>

Survey conducted reveals 85% to 95% of staff felt installation of permanent hanger in individual ICU room saves time and is less tedious than carrying effluent bags to DU for draining.

Furthermore, nil complaints were received from housekeepers about effluent spillage in DU. Decision was made to install permanent CRRT hangers in all ICU patient rooms.

**Survey results on draining effluent bag in patient room**

