

SAFE CHEST TUBE SECUREMENT

Project Leaders' names
(Toh.H.M.)
Ward A51
Khoo Teck Puat Hospital

Aim

The objective is to develop an effective chest tube dressing that is safe, easy to apply, hypoallergenic, non-bulky, transparent for direct observation, and cost-effective.

Background

Accidental chest tube dislodgement is one of the most common complications associated with chest tube placement. The clinical adverse event not only increases healthcare costs due to the need for reinsertion but also compromises patient safety, comfort, and recovery. Additionally, it causes psychological stress and feeling of guilt on nurses, who are responsible for ensuring proper tube care and securement.

At Khoo Teck Puat Hospital (KTPH), the significant number of chest tube dislodgement cases each year has raised concerns about the quality and safety of chest tube management. To address this issue, the chest tube workgroup committee has tasked a team of nurses with leading a quality improvement project. This initiative aims to enhance safe chest tube care by identifying the root causes of dislodgement, implementing preventive measures, and improving nursing practices. Through this project, the team seeks to develop evidence-based strategies that will reduce the incidence of chest tube dislodgement, ultimately improving patient outcomes, reducing healthcare costs, and supporting nurses in providing safer and more effective care.

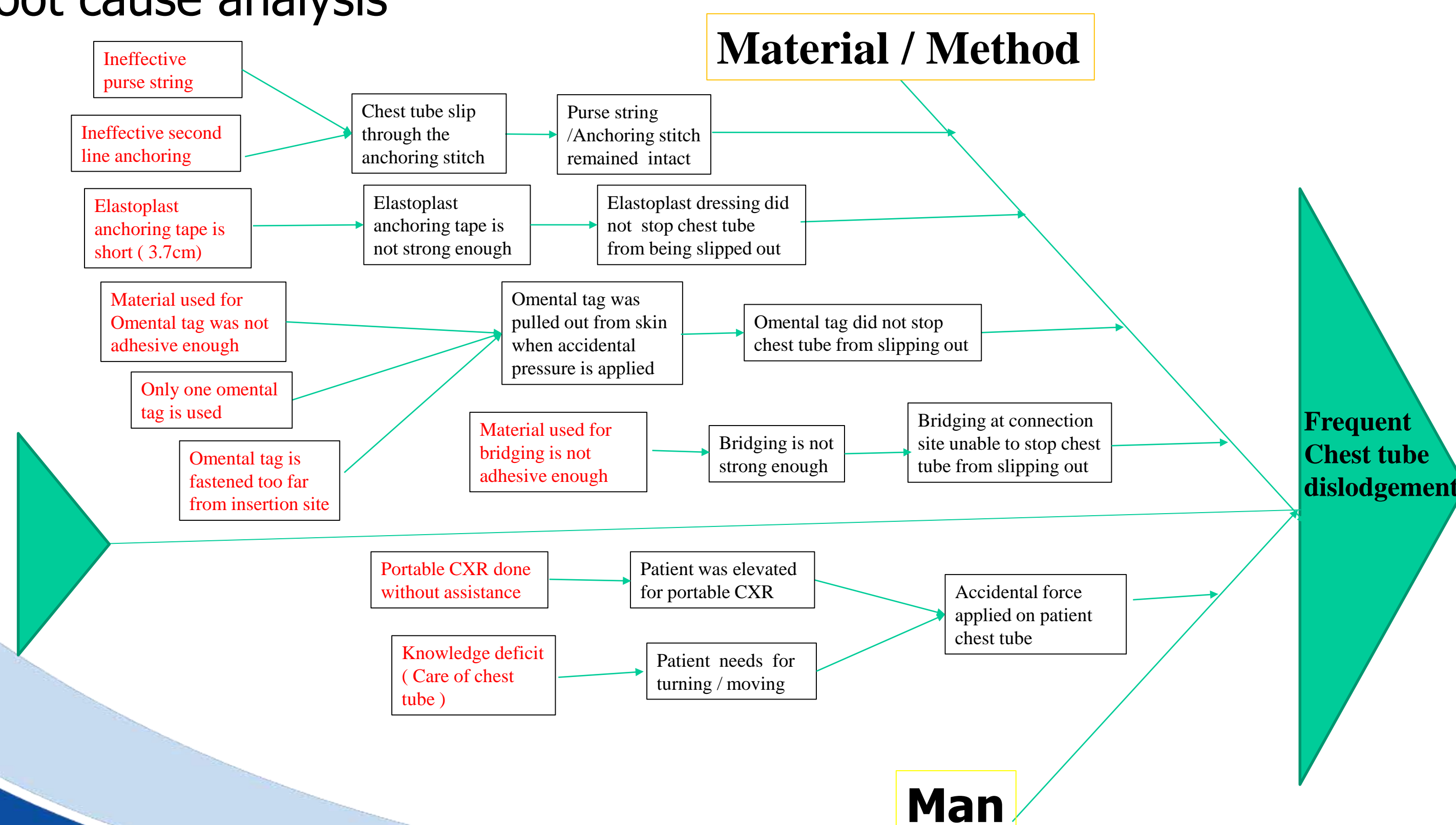
Team Members

Name	Designation	Department
Joyce Ho Nuo	NE	NADM
An-Nur Ain Faraliza Binte Razali	NE	NADM
Audrey Lim	ANC	NADM
Ong Yu Jing	APN/NC	NADM
Amanda Loh HuiQi	ANC	DDR
Nang May Sal Ween	ANC	DDR
Wong Yan Lee	NC	DDR
Lim Shui Ling	NM	A51
Esther Li Shihui	NM	A51
Chan Hoi Sum	SNM	A51/A52
Nurhazimah Binti Mohamad Vijaya	ANC	A52
Huang Shaohua	NC	A52
Roxanne Yeye Mamaril Aquino	SSN	A51

Interventions / Implementation

Current practice in KTPH & YCH uses traditional method of using Elastoplast with specific method of cutting and multiple strips to secure the chest tube. The team conducted a review across local institutions and found varying practices from using traditional methods to modified methods. These chest tube dressings are largely laborious, and effectiveness was undetermined. Literature review supported the use of dressing material such as Drainfix for small bore drains, Mefix for large bore drains. First, the team conducted a detailed root cause analysis of current practice of chest tube care from the insertion to patient bedside. Various possible root causes were derived and concluded by historical data extracted from PRISM system. Direct observation was also made by simulation of chest tube dislodgement. Fish bone chart was used to demonstrate the details of root cause analysis as below:

Root cause analysis

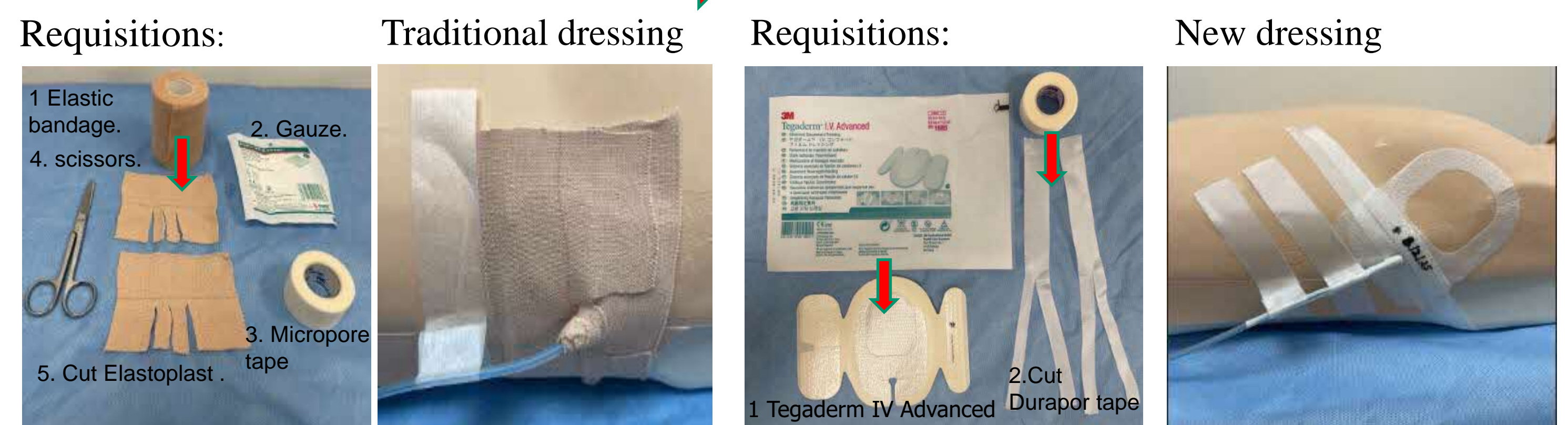


The team brainstormed for countermeasures to overcome root causes based on evidences of best practice and existing creative ideas that we can use or modify. The team discussed deeply and tested out various possible ideas and made the following recommendations for trial implementation:

Root causes	Corrective actions	Countermeasures
1. Ineffective anchoring stitch	To improve suture method & technique	Refer HP-CLIN-055 Policy on correct-site, correct-procedure, correct-patient surgery: Annex 2 : Anchoring suture techniques
2. Ineffective second line anchoring	To explore and innovate secondary anchoring and dressings	Adopt ETT anchoring technique for securement
3. Elastoplast anchoring tape is short (only 3.7cm)	To have longer, flexible length and stronger anchoring tape	Adopt Durapore tape as used in ETT securement
4. Material used for Omental tag was not adhesive enough (Micropore tape)	To source for stronger, adhesive tape	To adopt Durapore tape used in ETT securement
5. Only one omental tag is used	Use broader or more omental tag	To apply additional Omental tag as needed
6. Omental tag is fastened too far from insertion site	To apply at least one omental tag as close to chest tube insertion site	To apply one Omental tag immediately after the chest tube dressing
7. Material used for bridging is not adhesive enough (Elastoplast)	To source for stronger, adhesive tape	To use Durapore tape for bridging
7. Portable CXR done without assistance	Radiography to seek assistance when taking CXR	To remind radiographer to seek assistance as pt likely "unstable" who need portable X-ray
8. Knowledge deficit (Care of chest tube)	Patient education material : poster, brochure	To make care of chest tube poster /brochure

Results & Outcomes

Changing from Traditional  New Tegaderm chest tube dressing



Costing :

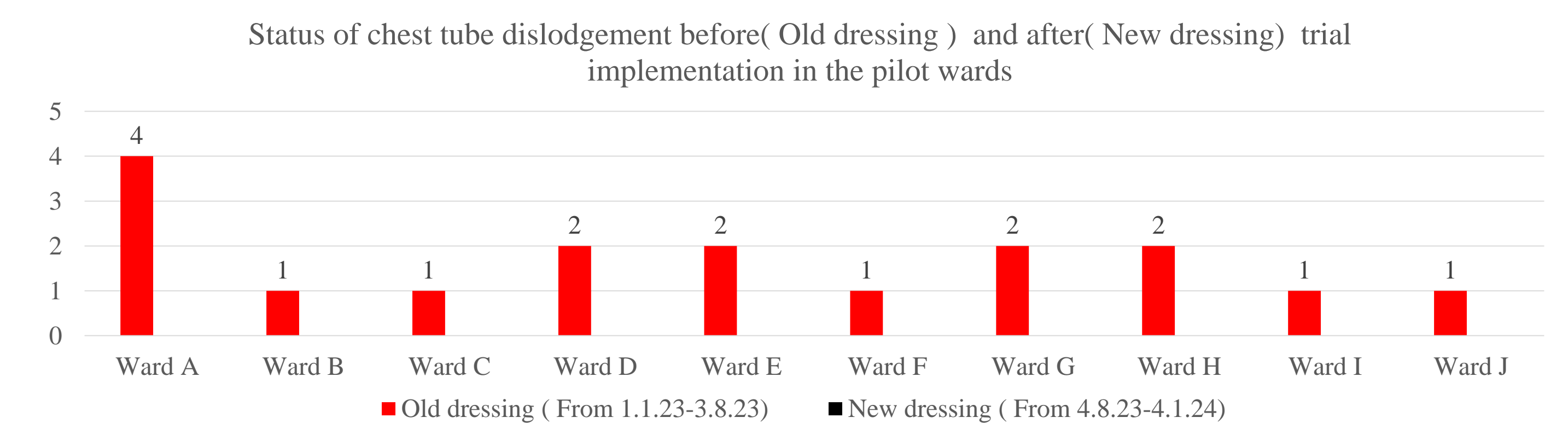
- Elastic bandage 7.5 cm : \$14/4.5 m
- Micropore tape : \$ 0.60/ roll
- Gauze : \$ 0.12 / packet

Costing :

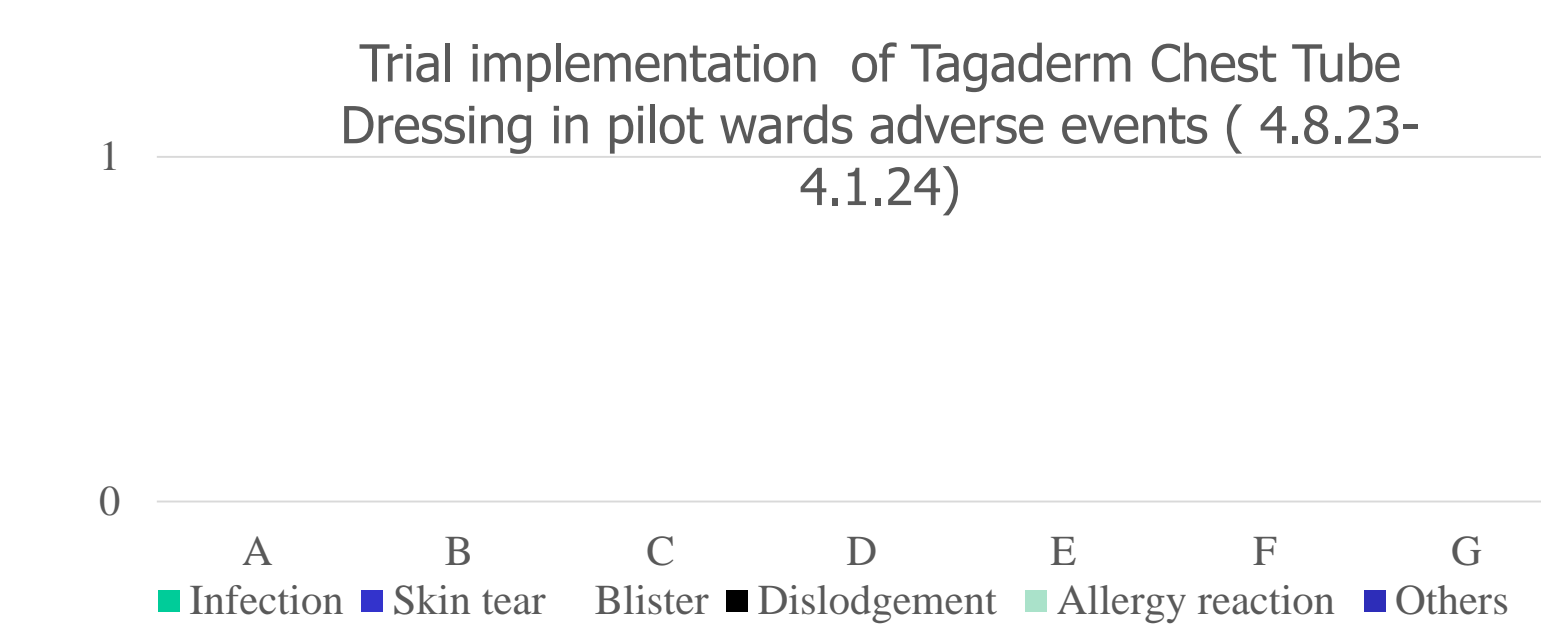
- Tegaderm IV Advanced : \$ 1.60 /piece
- Durapore tape : \$ 1.40/roll

From 4.8.23-4.1.24 : 32 patients of the pilot wards had used Tegaderm IV Advanced chest tube dressing. Outcomes monitored showed:

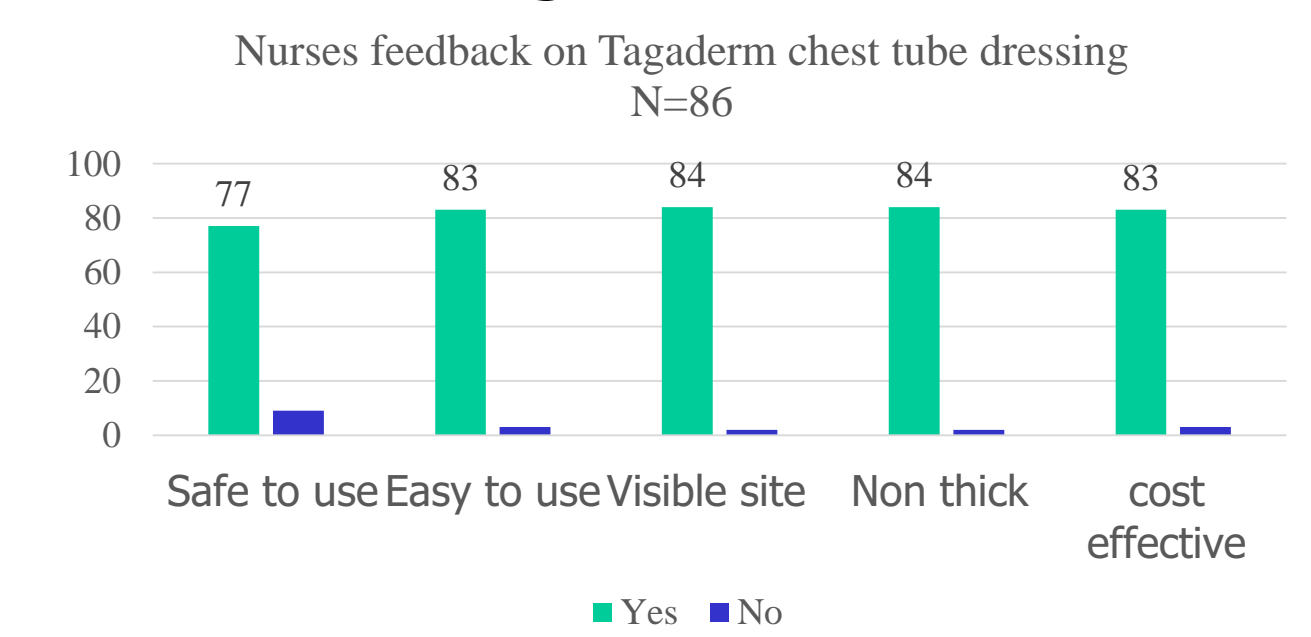
1. **There was zero incident of chest tube dislodgement observed**



2. **There was zero adverse effects found during trial implementation**



3. **Staff feedback on meeting criteria of new dressing**



Standardization

19.1.2024 : New chest tube dressing with Tegaderm IV advanced dressing was approved and standardised in KTPH

Onward 2026

Substantiality and follow-up

- Ongoing monitoring of nursing compliance
- On going review and improvement via updates at nursing quality meeting and nursing leader meeting for engagement and sharing of success of reducing chest tube dislodgement in KTPH.

Conclusion

We have successfully modified and simplified the traditional chest tube dressing using Tegaderm IV Advanced and Durapore. This improved dressing meets all the essential criteria for an effective chest tube dressing while significantly reducing chest tube dislodgement in KTPH.