THE COST OF CATHETER DISLODGEMENT

Preventing accidental drainage catheter dislodgement facilitates hospital cost savings and improved patient care

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ABSTRACT

National healthcare spending has rapidly increased over the past decade, urging many physicians, hospital administrators, and public policy experts to look for cost savings. One of the most common and financially cumbersome complications of patient care is hospital readmission due to medical device failure or malfunction. Catheter dislodgement—either due to patient/user error or technical failure of the device or attachment site—has been a significant problem for interventional radiology and patients. To remedy this, drainage catheter connectors have become an effective solution to preventing dislodgement, helping to increase cost savings and decrease patient complications.

INTRODUCTION

Percutaneously placed drainage catheters are commonly used in preoperative patients to reduce complications from infected or obstructed organs. In post-operative patients, they help to remove urine, exudative fluids as well as blood, preventing it from accumulating in the body.

Maintaining a drainage catheter in the proper position is crucial. Placement requires the utilization of significant resources (e.g., staff, time, and medical equipment), creating a steep financial burden for the patient or insurance provider. In addition, catheter dislodgement may cause distress to the patient, family members, and caregivers.

To prevent catheter dislodgement, the FastBreak™ Breakaway Connector (Merit Medical Systems, Inc., South Jordan, UT) is a two-piece patient safety device intended to serve as a conduit between a drainage catheter and an external fluid reservoir. One piece connects to the catheter tubing and the other piece connects to a drainage bag.

When in use, the two pieces attach and allow for uninterrupted fluid flow. If force is applied to the drainage bag, rather than the catheter dislodging, the FastBreak pieces will disconnect, reducing the risk of catheter dislodgement. The FastBreak is then reconnected.

The following reflects two case studies. In the first case, the FastBreak was not used, resulting in catheter dislodgement. In the second case, the FastBreak was used, preventing catheter dislodgement and hospital readmission.

CASE 1: NEPHROSTOMY CATHETER DISLODGEMENT

WITHOUT THE FASTBREAK

A 53-year-old male with a history of urosepsis due to obstruction secondary to bladder outlet obstruction underwent chronic bilateral percutaneous nephrostomy catheter placement. Despite securing the catheter into position with suturing and a StatLock™ Device (C.R. Bard, Murray Hill, New Providence, NJ), the patient reported that the left-sided catheter was "tugged on and fell out," needing emergency replacement.

This required a transfer to the emergency room (ER), a hospital admission, and the mobilization of interventional radiology nursing, technologists, and physician staff to replace the catheter.

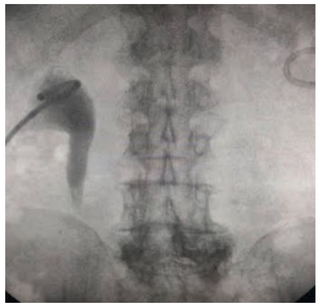

Figure 1: Nephrostomy Catheter

CASE 2: APPENDICEAL ABSCESS DRAINAGE CATHETER

DISLODGEMENT PREVENTED WITH FASTBREAK

A 50-year-old male presented with a history of sepsis due to ruptured appendicitis and a right lower-quadrant abscess. The patient underwent percutaneous abscess drainage catheter placement. The external catheter was projected to stay in position until the patient defervesced, and elective appendectomy was performed.

The catheter was secured using sutures and a StayFIX® Fixation Device (Merit Medical Systems, Inc., South Jordan, UT). To add a reliable breakaway point in the system, the FastBreak was also used.

The patient returned 3 weeks post placement for a drainage/abscess cavity check. He reported that the catheter "pulled apart" twice. In each instance, the FastBreak separated, not allowing the catheter to dislodge. The patient was able to reattach the FastBreak at home and did not require emergency replacement. He stated the FastBreak was "easy and intuitive to reconnect."

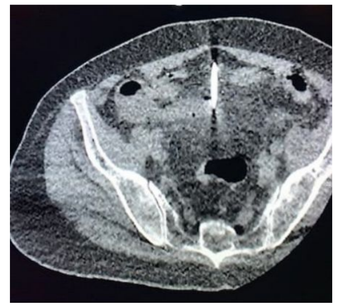

Figure 2: Abscess Catheter

COST ANALYSIS

In a sample size of 1,000 nephrostomy catheter placements and 300 abscess catheter placements annually, a total of 55 nephrostomy catheters and 60 abscess catheters would be expected to dislodge annually. Replacing these dislodged catheters would cost a staggering $553,245 and $352,920, respectively (Table 1). The addition of the FastBreak to hospital protocol could produce enormous savings.

The current national average procedure cost of nephrostomy catheter placement is $5,754.[1] Placement of a peritoneal drainage catheter to manage abscess accumulation is $1,577.[2]

Dislodgement of these external drainage catheters adds significant additional costs to the patient and healthcare system. Cost includes patient transport by emergency medical services, typically Advanced Life Support (ALS) transport, which provides services to mitigate pain, monitor vitals, fluids, and various other support modalities.

The following reflects the 2022 purposed transport rates[3] for the state of Connecticut: A one-way ALS transport for a patient requiring an ER transfer is $1,287. This cost is non-inclusive of per mile charge and wait times, which average $19.77 per mile and wait time charges that start at $215 per hour. Return rides via emergency medical services may range from ALS costs of non-ER transport, totaling $818 or Basic Life Support (BLS) transport, charging $813. ALS-ER roundtrip rides with BLS transport could cost the patient $2,105. Meanwhile, the average ER cost in the United States for a patient requiring admission for immediate treatment is approximately $2,200.[4]

Research has shown that dislodgement for nephrostomy catheters can total 5.5%.5 In addition, peritoneal or abscess drainage catheter dislodgement, kink, or obstruction can be common, with some data reporting occurrence in 20% of patients.[6]

A hospital system covering 3,000 patient beds could have a 1,000-patient sample of nephrostomy catheter placements and 300 abscess catheter placements annually. In this hospital system, a total of 55 nephrostomy catheters and 60 abscess catheters would be expected to dislodge annually. Replacing these dislodged catheters would cost a staggering $553,245 and $352,920, respectively (Table 1).

The addition of the FastBreak to hospital protocol could produce enormous savings. In this hypothetical situation, this add-on would conservatively decrease dislodgement in the range of 5%–25% of patients, which would result in a savings of more than $45,000– $226,000 per 1,000 nephrostomy and 300 abscess catheters placed (Table 1). Over the entire medical community, the savings could be millions of dollars annually, with a profound effect on the United States healthcare system.

Table 1: Catheter Dislodgement Rate with Annual Costs and Potential FastBreak Savings

Type of Catheter	Catheter Dislodgement Rate	Catheter Replacement Cost	Cost of Annual Catheter Replacement Post Dislodgement	Potential Savings with FastBreak (5% Annual Decrease of Catheter Dislodgements)	Potential Savings with FastBreak (25% Annual Decrease of Catheter Dislodgements)
Nephrostomy	5.5%	$10,059.00	$553,245	$27,662	$138,311
Abscess	20%	$5,882.00	$352,920	$17,646	$88,230
Total			$906,165	$45,308	$226,541

Figure 3: FastBreak Breakaway Connector

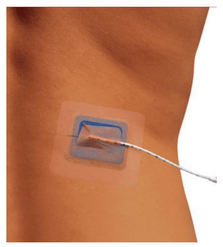

Figure 4: StayFIX Fixation Device

CONCLUSION

Catheter dislodgement is a costly complication of external drainage catheters. Reducing dislodgement can save the United States healthcare system millions of dollars. The addition of the FastBreak Breakaway Connector device when placing a drainage catheter is likely to save money and resources and reduce patient complications.

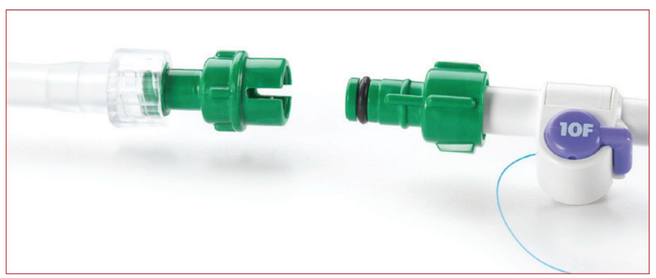

Figure 5: FastBreak Breakaway Connector assembly with a ReSolve® Catheter (Merit Medical Systems, Inc., South Jordan, UT)

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2. Costs are determined by using the most recent Medicare data regarding the cost for each procedure code. The cost comes from CMS analysis of the entire body of claims in the U.S. from all hospital outpatient departments' procedures by CPT code. Included in the cost are the specific procedure-related supply items charged with revenue codes. The costs reported reflect the median cost. 3. Gifford DS et al. 2021 May 26. "Short-Form Rate Application Package for Requesting 2022 Rates." State of Connecticut Department of Public Health. https://portal.ct.gov/-/media/ Departments-and-Agencies/DPH/dph/ems/pdf/Home/2022-Short-Form-Rate-app-updated.pdf
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ACKNOWLEDGEMENTS

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