

# A DECADE OF SECURITY: DATA-DRIVEN PRACTICE CHANGE

Carol McCormick, RN, BSc Hons, MSc

In my practice at The Clatterbridge Cancer Centre NHS Foundation Trust, Liverpool – a specialised cancer treatment centre based within the Merseyside and Cheshire region, England – many of our cancer patients may have a peripherally inserted central catheter (PICC) placed to receive various forms of intravenous therapies including chemotherapy and immunotherapies in addition to being able to retrieve atraumatic blood samples. The PICC must remain securely in place until the end of the patient’s need for the catheter. The end of need (EON) for this patient population may include stopping or completing therapy, moving to an implanted venous access device (IVAD, i.e., port, port-a-cath), or through the end of life.

In 2007, I commenced the role of the Intravenous and Interventional Clinical Nurse Specialist prior to developing a larger vascular access team (VAT) as capacity and demand grew. One of the primary tasks of the role was to place PICCs, among other vascular access devices, for our large oncology

population. As I believe data is vital to assess success or areas for improvement, I began tracking every patient from implant to explant of their PICC.

From 2007 to 2011, various adhesive securement devices (ASD) were employed to ensure the PICC would stay in place through activities of daily living.<sup>1,2</sup> Simultaneously, the VAT increased successful placements and continued to track results. The problem of catheter replacements secondary to migration and dislodgement became apparent. The below table shows the increased number of PICCs placed by our small team and the number of PICCs that reached the end of need during my first years in charge of the VAT.

Patients dealing with a cancer diagnosis, multiple infusions, blood specimens, side effects, and other life events should not be subject to catheter replacement and delays in treatment because a catheter was not secured. In 2012, the VAT explored options to decrease

securement failures and came upon a completely different approach to securing catheters.

A subcutaneous anchored securement system (SASS) deploys atraumatic nitinol feet under the skin while the patient is still numb from the lidocaine used during the insertion procedure. As the name implies, the device anchors the catheter and remains with the PICC until the end of need.<sup>3,4</sup>

With chemotherapy medications our patients receive, it is critical that we dwell the tip of the PICC in the lower one-third of the superior vena cava (SVC) near the caval-atrial junction.<sup>5</sup> Hemodilution at this optimal position decreases the probability of vessel damage and thrombus formation. For a VAT member placing a PICC, 40cm to 50cm of the small catheter must be navigated past upper arm valves and vessel branches to reside in the target area. Securing the tip in this location depends on the clinician’s choice of engineered securement device (ESD) to safeguard the catheter in the optimal position.<sup>7</sup>

Based on the repeated need for catheter replacement from 2007 to 2011 and the substantial increase in the VAT’s PICC placement requests, it became necessary to avoid catheter replacement, minimize additional patient trauma, and ensure appointments are available for new patients. Therefore, in 2012, after trying a couple of

YEAR	NUMBER OF PICCS PLACED	NUMBER WITH REMOVAL DATA RECORDED	MEAN DWELL TIME (DAYS)	NUMBER REACHING END OF NEED	PERCENT REACHING END OF NEED
2007	16	2	Not reported	0	0%
2008	26	4	109	3	75%
2009	119	59	88	34	59%
2010	193	193	105	147	76%
2011	313	313	103	258	82%
<b>Cumulative</b>	<b>667</b>	<b>571</b>	<b>101</b>	<b>442</b>	<b>77%</b>

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different adhesive securement devices (ASD), we discovered a subcutaneous anchor securement system (SASS) that was new to the market.<sup>4</sup>

As the SASS was first introduced, we trialed it on 30 patients and carefully tracked the results. The SASS is an entirely different method of securement from the ASD but did not take long to convince the VAT and the patients that it improved the likelihood of reaching the EON with one PICC. Interestingly, patients who, at the time of the trial period, had experienced a PICC failure when secured with an ASD and required a replacement, felt more confidence with the securement of their line and reported increased satisfaction with the service.

As our team saw the improvement in the securement of the PICCs, we quickly decreased our use of ASDs. Significantly limiting the need for replacement for any reason, including; infection, skin issues, migration, and dislodgement, among others, was an important outcome for our patients and our team.

Focusing on the main reason for securing a catheter, our

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YEAR	ADHESIVE SECUREMENT DEVICE	ASD MEAN DWELL TIME (DAYS)	SUBCUTANEOUS ANCHOR SECUREMENT SYSTEM	SASS MEAN DWELL TIME (DAYS)
2009	58%	88	Unavailable	NA
2010	76%	105	Unavailable	NA
2011	82%	103	Unavailable	NA
2012	77%	110	92%	132
2013	ND	NA	93%	118
2014	ND	NA	95%	111
2015	83%	140	96%	154
2016	92%	127	96%	141
2017	ND	NA	96%	139
2018	ND	NA	99%	128
2019	ND	NA	100%	137
2020	ND	NA	99%	163

*This table shows results from 2009 through 2020.*  
 ND = Not enough data or < 30 subjects | NA = Not applicable

YEAR	ADHESIVE SECUREMENT DEVICE	NUMBER OF PICCS SECURED WITH ASD	SUBCUTANEOUS ANCHOR SECUREMENT SYSTEM	NUMBER OF PICCS SECURED WITH SASS
2009	20%	59	NA	0
2010	12%	193	NA	0
2011	11%	313	NA	0
2012	14%	224	< 1% (0.4%)	231
2013	0%	5	< 1% (0.5%)	576
2014	17%	12	< 1% (0.5%)	800
2015	12%	42	< 1% (0.3%)	936
2016	5%	62	< 1% (0.6%)	1114
2017	7%	15	< 1% (0.003%)	1269
2018	0%	9	< 1% (0.003%)	1062
2019	0%	9	0%	1159
2020	0%	1	< 1% (0.003%)	1166

NA = Not available until 2012



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replacements caused by migration or dislodgement dropped to nearly zero as the number of PICCs placed increased significantly over a decade. The table below compares the removals related to migration and dislodgement and the clear increase in demand for our services.

Improving patient outcomes does not take place if the problem is not identified. Inputting data into an Excel spreadsheet and ignoring what that data is telling us is an act of futility. As professionals specializing in vascular access, I believe we must continually assess our current practices, stay up to date on new technology, and

thoroughly analyze the data to improve outcomes. For example, securement issues begin with the facts or the data and, in this case, ends with our patients needing only one PICC to finish their care.

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