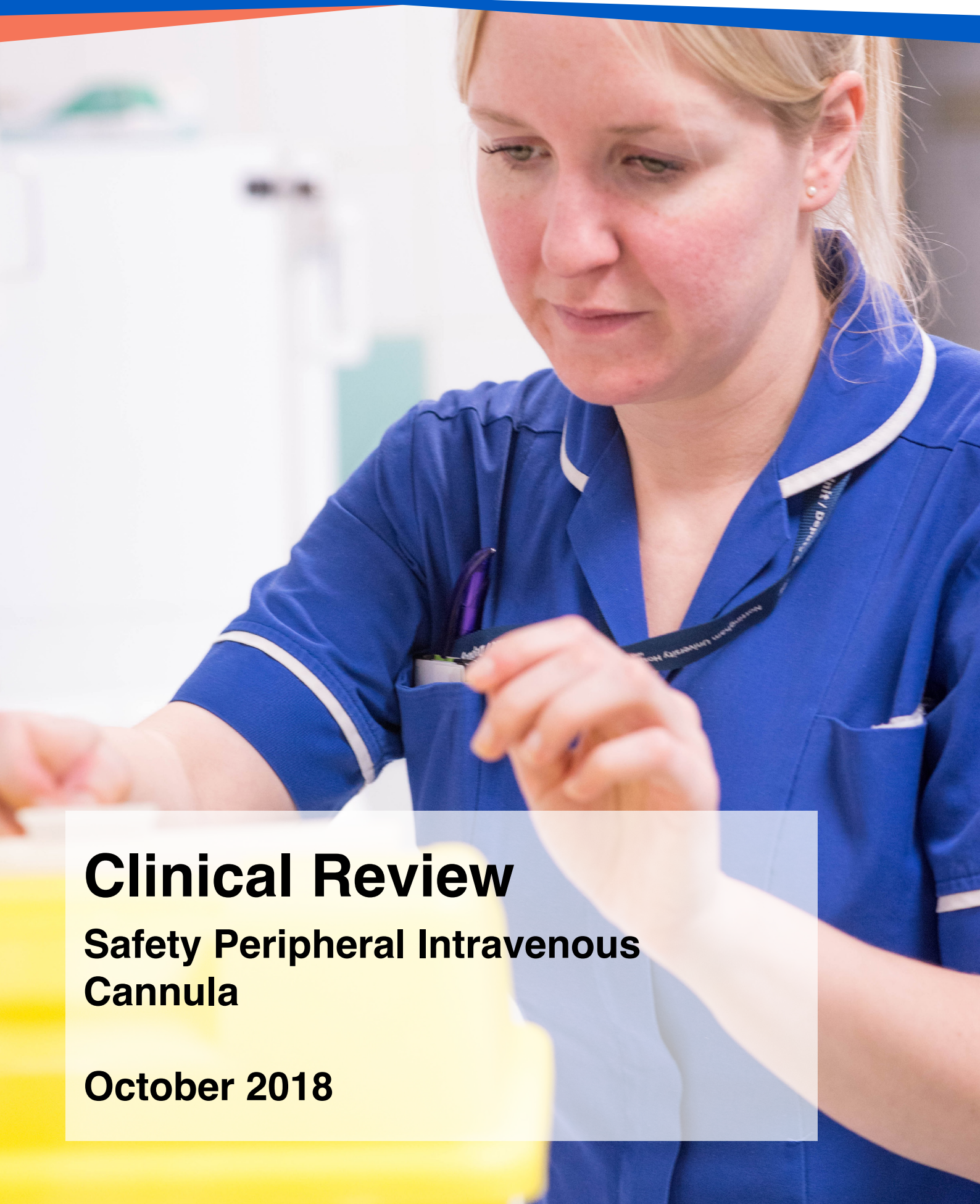
NHS Clinical Evaluation Team
by the NHS, for the NHS



Clinical Review

Safety Peripheral Intravenous Cannula

October 2018

Contents

Guidance for use

This clinical evaluation report is aimed primarily at the NHS and all those working to support patient care.

Please note that the product assessment results should only be read and used in conjunction with the full text of this clinical review.

1 Introduction

The NHS Clinical Evaluation Team was established in April 2016. The team's remit is to add independent clinical review to 'everyday healthcare consumables' used by the NHS.

Everyday healthcare consumables are products found in the majority of wards, clinics, health centres, treatment rooms and community nurses' bags across the NHS. The purpose of this report is two-fold: firstly, to provide a clinical assessment of the usability and requirements from the NHS Safety Peripheral Intravenous Cannula or Catheter (SPIVC) that are available to the NHS from the national procurement provider and secondly, to provide a clinical statement of desired functions and properties that the clinicians in the NHS require of SPIVC for use in future procurement activities.

It is clear from the evidence that the SPIVC featured in this report are everyday healthcare consumables that are found in pre-hospital care, some community settings, outpatient and most acute ward settings, hence they are items included in any stock list when setting up a new clinical service. On that basis, the project was approved by the Clinical Reference Board (CRB) culminating in the production of this report for their approval in October 2018.

Based on NHS Supply Chain data, over 300 NHS Trusts use SPIVC, with over 25 Million SPIVC sold annually resulting in a total spend approaching £25 Million in 2016-2017 with 0.32% increase in 2017-2018. There are over 200 different SPIVC product codes supplied via 8 different suppliers. This report covers the range of products available as of August 2017.

Intelligence about SPIVC was initially gathered from a variety of sources to provide background information on the current evidence available to support the way products are designed and clinically evaluated.

Subsequently clinical engagement sessions were held with frontline NHS clinicians with the aim of identifying important clinical criteria for SPIVC. This information was used to develop the clinical criterion against which brands available from the national procurement provider were reviewed.

Findings from these clinical reviews have been collated into a product assessment report to allow users to identify products and see how they performed against the agreed clinical criteria.

A more detailed description of the team and our pathway approach can be found in the NHS Clinical Evaluation Team operating manual which can be found on our website at: www.supplychain.nhs.uk/CET

2 Clinical Context

2.1 Clinical Definition and Scope

Modern IV catheters/cannulae was revolutionised in the 1950's at the Mayo Clinic in the United States (Rivera, 2005). Advances in technology and incorporation of best evidence practices have led us into "smarter" integrated systems. Safety Peripheral Intravenous Cannula or Catheter (SPIVC) is a vascular access medical device which is directly threaded into a vessel after venepuncture with a needle, known as a stylet ("catheter over the needle" configuration) for the purpose of administering intravenous (IV) therapy such as IV fluids or medications, directly into a blood vessel or obtain a blood sample at the time of insertion.

This report is mainly focused on SPIVC used for the purpose of administration of compatible and/or appropriate IV therapy. This evaluation was based upon one cannula gauge, due to the variety of gauges and products available and limited resources. It does not therefore include non- safety products, i.e. no needle safety mechanism or shield, or any other cannula/catheter not intended for venous access.

Within the NHS Supply Chain (NHS SC) framework, there are numerous different needle gauges, sizes and lengths of SPIVC. There is a degree of ambiguity with the descriptions of a number of products; therefore this report presents subcategories, using groups and materials.

For the purpose of this report, the SPIVC is subcategorised into four groups:

- Ported Cannula
- Non-Ported Cannula (Straight or Non-winged)
- Non-Ported Cannula (Winged)
- Integrated Cannula

Within these four groups the SPIVC are used in different clinical settings.

Intended Clinical Use

SPIVC is designed as a vascular access device facilitating the administration of appropriate short-term (3-5 days) IV therapy infusions, such as IV antibiotics, chemotherapy, and parenteral nutrition, as well as for bolus intravenous injections or short infusions in the outpatient/day unit setting and blood sampling (RCN Standards for infusion therapy, 2016).

Professional guidance by consulting vascular access and IV therapy experts and an academic literature review have been undertaken to substantiate the development of clinical criteria to support the evaluation of these products.

2.2 Clinical Practice

SPIVCs has been clearly demonstrated in the literature as the most commonly used device for obtaining vascular access in various clinical settings. Almost a billion

SPIVCs are inserted around the world each year and noted that up to 60% of inpatients in UK hospitals will have at least one peripheral IV access device in use (Alexandrou et al 2015). It is widely documented, that because it is an invasive and frequently used procedure, it is associated with a range of negative outcomes, local and systemic complications. The most common of which is mechanical phlebitis due to trauma to the vessel, which could result to inflammation and subsequently thrombosis and sepsis. Therefore whilst the risk of complications for the individual patient such as SPIVC- related bloodstream infection (BSI) is low, the absolute number of reported complications is high. This emphasises the need not just for accurate patient assessments but also for careful product selection.

2.3 Clinical Impact

2.3.1 Impact on the patient

It is widely noted in the UK, that one in three patients admitted into hospital has at least one peripheral IV cannula. Evidence shows that, insertion of SPIVC is the most common invasive procedure, effective and quickest venous access device of choice for administration of IV therapy (Barton 2018; Carr et al, 2016).

An ideal SPIVC should facilitate delivery therapy into peripheral veins without subsequent avoidable undesirable outcomes. SPIVCs come with widely documented associated complications: Bacterial, Chemical and Mechanical Phlebitis, bacteraemia, extravasation/infiltration, haematoma and sepsis. In today's era of advanced technology cannula/catheters are designed to prevent many of these complications. These complications may be avoided if health care professionals adhere to guidelines, for example, aseptic non-touch technique (ANTT), decontamination of site of insertion before cannulation careful monitoring and selecting the right device. Relevant to this report, the theory behind device selection is well documented. The epic 3 guidelines (2014) and the Vessel Health and Preservation (VHP) framework, evidence how to select the right IV device at the correct time in relation to IV Therapy duration. Use of the VHP framework can ensure that the right vein and vascular access device are selected when needed (Hallam, et al 2016; Moureau, et al 2012; Shaw, 2017). However, SPIVC selection can still be quite daunting due to the variations available for purchase via the NHS SC framework. Although SPIVC designs and individual features vary these variations may or may not have been influenced by clinicians over the years.

Another highlighted issue in our conversations with clinicians is pain. It is not just associated with skill and speed of the inserter, but more importantly the sharpness and geometry of the needle tip, the gauge of the catheter, and the material of the plastic in the catheter.

In this report, a needle penetration test (See Chart 1) was conducted to measure the force required for the needle and cannula to penetrate skin. The test involved piercing an acetate film (0.12 mm thickness) and the use of a tensometer to measure the force required.

In addition to this a “Stiction test” (otherwise known as stationary friction), was performed (See Chart 2). It is a test of the static friction that needs to be overcomed to enable relative motion of a stationary object in contact with another surface. The test is designed to assess the initial stiction that has been evident with some designs of cannula which can result in displacement of the cannula from the patient. Due to variability in safety cannula designs, in which some of the highest forces recorded are not on the initial withdrawal of needle and for the purpose of this report the initial 20mm withdrawal distance was measured.

Both tests were performed on 3 replicates and the mean force was calculated.

It will be noted as well in this report, a subcategory by catheter material used to help practitioners make an informed decision with their SPIVC choices.

2.3.2 Impact on the clinician

For a clinician, the ideal catheter should provide protection to the user against sharps injury with advanced engineering to ensure safety and ease of use. An SPIVC which protects the tip after use, preferably passively as an additional safety measure that also prevents the escape of blood thereby providing protection against muco-cutaneous exposure (Council of the European Union, 2010; RCN Sharps safety, 2011;).

A rapid reliable blood flashback after penetrating the vein will prompt the clinician to stop advancing and thereby making traversing the opposite wall of the vein (transfixation) less likely is advocated. Additionally visibility of the puncture site, with transparent cannula/catheter components (e.g. transparent wings) will enable the clinician to observe the site at all times. Furthermore” closed” system with needleless access to ports also prevents bacterial entry more efficiently than conventional ones (Barton, 2018).

Thus for the majority of clinicians the optimal SPIVC is one with a flat profile which allows a dressing to cover it smoothly without wrinkling, making it less likely to catch on objects in the environment and accidently dislodge.

2.4 Other Clinical Considerations

The materials used for the cannula/catheter change their stiffness after a period of time at body temperature (i.e. in the vessel) and are less likely to kink or bend therefore reducing mechanical phlebitis. However, this sits outside this evaluation. Furthermore, there is little evidence to show that catheter material is important in the aetiology of catheter related complications.

SPIVC dwell-time remains an area of debate in the literature. More than a decade ago, the Infusion Nurses Society (INS) recommended IV site rotation every 72 hours or less and in 2011 the recommendations changed to being based upon clinical indication. Similarly, the epic 3 Guidelines (IVAD 28) recommends, peripheral vascular catheter insertion site should be re-sited when clinically indicated and not routinely, unless

device-specific recommendations from the manufacturer indicate otherwise. Conversely, the Centres for Disease Control and Prevention (CDC, 2011) guidelines continue to make no recommendation for IV site rotation. Hence manufacturer's recommendations should be followed and clinicians should adhere to local hospital or clinical setting' policy.

2.5 Product Technical Design

A SPIVC is composed of a hollow, metal needle that is bevelled at one end and sheathed in a plastic catheter tube. It is usually less than or equal to 7.5 cm in length (Rivera, 2005). The ranges available in the NHS SC catalogue are indicated in the matrices.

It has a safety engineered needle safety device that essentially passively or actively activated as the needle is withdrawn when the vessel is accessed and cannula/catheter component is in situ. As stated in the beginning, for the purpose of this report, SPIVCs evaluated are subcategorized into the following designs:

- Ported Cannulae are with an additional port or opening built onto the top of the cannula hub with a closure from tethered, irreplaceable cap. These are also known as "open cannula" which has no blood control which means vein occlusion is required to reduce risk of blood leakage and spillage (Dougherty and Lister, 2015).
- Non-Ported Cannula (Straight or Non-winged) are without a port on the neither hub nor stabilisation platforms.
- Non-Ported Cannula (Winged) are with stabilisation platforms (wings), which aid in securement of the device, reducing the risk of" pistoning" (micro movement) in the vein, thereby reducing risk irritation of vessel wall (phlebitis) (Dougherty and Lister, 2015).
- Integrated Closed Cannula are non-ported device with a pre-attached extension set and integral needle-free connectors and a stabilisation platform which reduces" pistoning" within the vessel ("Bausone-Gasda et al 2010). These provided closed integrated system with a passive safety mechanism.

3 Pathway Methods

The evaluation followed the process given in the CET operating manual, and as approved by the overseeing Clinical Reference Board.

3.1 Intelligence Gathering

In preparing the criteria for this evaluation, the relevant clinical evidence, known guidance and nationally recognised publications, as further described in this Section 3, have been incorporated. Suppliers listed within the national framework were invited to provide clinically relevant evidence. The majority of suppliers provided information ranging from information brochures to technical data sheets.

3.1.1 Literature search

A literature search was undertaken to establish what current academic knowledge exists on the products for evaluation. It should be noted that the team have not conducted a systematic review of the literature. However, the team have interrogated the information to look for common themes which supported the development of the clinical criteria.

Initially, an evidence search was performed across the NICE service:

There were no returns from this search which stated the clinical requirements in the development, design and supply of the products.

The search terms used (see below) generated many returns, however, there was little new information generated of relevance.

Search criteria	Databases searched
• Vascular Access • Peripheral Venous Access • Safety Peripheral IV Catheter	• **NICE website Evidence search https://www.evidence.nhs.uk/** • **Medline, NICE, https://www.supplychain.nhs.uk/** • **Cochrane, NIHR and Grey Literature.** • **NICE website journals and databases https://www.nice.org.uk/about/what-we-do/evidence-services/journals-and-databases** • Further search of specialist resources including**: NICE, SIGN,**
Date Range	**Since 2005**

Figure 1 – Literature and other sources searches – Safety Peripheral Intravenous Cannula" under the table

3.1.2 National procurement provider specification

As the national procurement provider, the NHS Supply Chain manages a framework of suppliers listed in the national catalogue. However the framework covers a wider selection of products than just safety peripheral intravenous cannulae. The national provider specification (NHS Supply Chain) has been reviewed to understand what suppliers of these devices have previously been asked. However this specification (NHS Supply Chain) gives insufficient detail relating to the clinical criteria relevant for safety peripheral intravenous cannulae, it has been considered in the process for developing such criteria.

Standard /Certification
Medical Devices Directive 93/42/EEC All products classified as a Medical Device must have their CE marking clearly evident on the product and/or packaging **BS EN ISO 10993-1: October 2009** Biological evaluation of medical devices. Evaluation and testing within a risk management process

- All products and packaging should be latex free where possible. Any products or packaging containing latex must be clearly labelled as such to inform the user
- Any product containing phthalates must be indicated on the packaging in accordance with Directive 2007/47/EC (amending Directives 90/385/EEC and 93/42/EEC).
- In accordance with the Control of Substances Hazardous to Health (COSHH) Regulations 2002 (as amended) safety data sheets for all products that fall under this Regulation must be provided to NHS Supply Chain

In accordance with the Control of Substances Hazardous to Health Regulations 2002 (as amended) safety data sheets for all product lines that fall under these Regulations must be provided to NHS Supply Chain.

- During the term of the Framework Agreement NHS Supply Chain must be made aware of any awarded product line that is classed by the MHRA as a Medicinal Product.
- All product line(s) must be delivered to NHS Supply Chain, or in the case of goods delivered via the Direct Route of Supply to the end customer, with a minimum 2 years shelf life.
- Any shelf life limits and/or specific storage conditions (required after opening or reconstituting) for the product must be clearly stated on the product packaging.

- NHS Supply Chain (or any third party appointed at the absolute discretion of NHS Supply Chain) reserves the right to test product lines throughout the term of the Framework Agreement to ensure it complies with the Specification and meets customer requirements provided these have been made known to the supplier. If any product lines are found not to comply with these requirements then the NHS Supply Chain reserves the right to:
- Charge for the cost of testing and any required retesting.
- Suspend the sale of the affected product line(s).
- Terminate the Framework Agreement in accordance with the provisions set out therein.

It should be noted that although the NHS Supply Chain specification provides insufficient detail relating to the clinical criteria relevant for safety peripheral intravenous cannula; these specifications have been considered in the development process of the clinical criteria

3.1.3 National and international safety and quality standards

Account has also been taken of appropriate standards, international and other, pertaining to the devices (e.g. from the International Organisation for Standardisation (ISO), European Standards (EN) and/or British Standards Institution (BSI). A review of the Medicines & Healthcare products Regulatory Agency (MHRA) alerts has also been performed, with product alerts relating to this product category identified however the Medical Device Directive 93/42/EEC as amended is currently in transition to the new Medical Device Regulation MDR 2017/745 whereby:

- All products classified as a Medical Device must have their CE marking clearly evident on the product and/or packaging and meet the requirements set out within the standard(s) related to labelling.

3.1.4 Product suppliers and manufacturers

All suppliers listed within the national framework were invited to submit relevant evidence, product information and testing data to help support the review. This was guided by provision of a standardised data set to promote return of relevant and consistent information such as:

- Product description and medical device classification.
- Copies of certificates of conformity to relevant EN and ISO standards
    - **ISO 10555-55:2013**
    - **ISO 9626**
    - **EN ISO 13485:2016**. Quality management systems for medical devices
    - **BS EN ISO 14001**. Environmental management systems
- Copy of declaration of conformity to **MDD 93/42EEC** or **MDR 2017/745**.
- Technical data sheets.

- Details of adverse incident reports (if any have occurred)
- Copies of company protocols for product recalls and actions should these be necessary.
- Indications for use and precautions/contra-indications for use.
- Any potential allergens the product contains.
- Range available.
- Instructions for use.
- Shelf life of product
- Any existing clinical evidence or laboratory testing to support product quality and effectiveness.

3.1.5 Quality of evidence

Hierarchy of evidence

Levels of evidence sometimes referred to as hierarchy of evidence were assigned to studies based on the methodological quality of their design, validity, and applicability to patient care.

Hierarchy ranking	Description
Level 1	A systematic review of all relevant randomised controlled trials (RCT) or evidence-based clinical practice guidelines based on systematic reviews of RCT evidence
Level 2	Evidence from at least one well designed RCT
Level 3	Evidence from well-designed controlled trials; non-randomised, quasi experimental
Level 4	Well-designed case control & cohort studies
Level 5	Systematic reviews of descriptive and qualitative studies
Level 6	Evidence from a single, descriptive or qualitative study
Level 7	Evidence from the opinion of authorities and/or reports of expert committees

Figure 2 – Hierarchy ranking: Evidence based practice in nursing & healthcare: a guide to best practice" (B.M. Melnyk & E. Fineout-Overholt; 2005; p10)

In clinical practice, it is encouraged to search and utilize the highest level of evidence (Level 1) for any clinical foreground questions. Clinicians come across with an ever rapidly growing and changing body of evidence. As randomised control trials (RCTs) are designed without biased and with minimal risk of systematic errors, it is recognised as the gold standard level of research trial (Tidy, 2014). However, with the fast moving advancements with available products in IV therapy and as IV practice moves forward, vascular access experts' recommendations to consider that the optimal research

method may produce the most valid, practical outcome in practice. RCTs may be the gold standard, but they should not be the only research method seen as valid and reliable. Case studies may potentially be of better fit in current clinical IV practice. In addition, clinical judgement should not be underestimated as it is a critical and fundamental aspect of what we do as IV practitioners.

3.2 Best Practice Guidelines

There are a variety of peer reviewed publications and guidelines relevant to SPIVCs and their use. In the UK, the key recent publications and clinical practice guidelines are from the British Journal of Nursing – IV Therapy supplements, RCN Standards for infusion therapy, epic3: National Evidence-Based Guidelines for prevention healthcare-associated infections in NHS hospitals in England. Internationally, the Journal for Association of Vascular Access (JAVA), Infusion Nurses Society (INS) - Standards of practice for infusion nurses, Centres for Disease Control and Prevention (CDC) – Prevention of intravascular catheter-related infections. Furthermore a number of local guidelines, produced by individual or aligned NHS providers, were considered offering guidance on vascular access device selection, including peripheral venous devices.

3.3 Patient Perspectives

Patients describe their experience with IV access devices as a “necessary evil” (Larsen et al 2017). Anecdotally, patients would express differing levels of anxiety and pain during peripheral cannulation procedure. Phlebitis is a common complication for 20-80% of patients who receive PIVCs. It is not just painful for patients but also costly in terms of healthcare resources.

4 NHS Clinical Engagement

In order to develop a shared vision of what is required from SPIVCs, several methods of engagement were used. These events were used to formulate thoughts, ideas and needs from different clinicians familiar with these products. This facilitated identifying their own expectation(s) of the product for their given patient group, intended patient outcomes, and use in a variety of differing clinical environments.

Mapping exercises were undertaken to determine the personnel that should be involved and/or consulted with regarding these products. This stage of the report focuses on clinical staffs that are:

a) recognised as subject matter experts, and/or
b) recognised regular users of the devices in their clinical practice.

Various methods of engagement were undertaken to ensure these clinical opinions were robust and validated by peers from around the country, options for engagement included:

- Regional and national face-to-face events with NHS clinical colleagues
- Focussed visits to NHS clinicians regional and national face-to-face events
- Website subscription
- Attendance at NHS Business Services Authority events
- Web-based surveys and e-engagement tools (e.g. email, WebEx, portal based surveys)

4.1 Clinical Conversations

To build a broad caucus of attendees at our events letters were sent inviting Trusts to nominate clinical colleagues to attend a series of regional group events. These were hosted by NHS organisations throughout England to enable the widest possible access for all invited whilst avoiding any pre-existing regional variance.

Details of the discussion outcomes were recorded online from the open events and survey circulated to the specialist vascular access and IV therapy network via National Infusion and Vascular Access Society (NIVAS). Some respected members from World Congress for Vascular Access (WoCoVA) were also consulted for their expert opinion. Information received from these sources were transcribed and combined. This was then used together with the evidence gathered at the previous project stage to inform a list of clinical criteria against which the product has been tested.

4.2 Clinical Criteria

The data received from all the NHS clinical conversation events, alongside the data collected from individual experts, was assimilated into a series of clinical criteria.

A clinical criterion is defined for the purposes of this report as a principle or standard by which products may be evaluated. It is a statement which describes the clinician's requirements for the product.

The proposed criteria were validated by workshop attendees and all other clinical experts engaged in the development process. In addition, other clinical experts who are likely to add further useful insight were also included, leading to the finalised clinical criteria listed below in Figures 3 and 4.

4.2.1. Criteria explanation- Inclusion

To enhance the readers understanding of this report, and to provide value to the results, an explanation for the defined clinical criteria is captured.

Clinical Criteria – Safety Peripheral IV Cannula	Rationale (Derived from Consultation with Clinicians)
PACKAGING	
The box/outer packaging shows the product category/type	Clinicians have highlighted that this will facilitate appropriate and timely choice as the clinical setting may not be familiar i.e. storage system and this will help reduce waste.
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	To confirm that the packaging has information needed by users and meets standards required by EU directive and ISO.
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	Clinicians need this to ensure appropriate product is readily available facilitating treatment, to prevent waste if wrong size is opened and risks for patients.
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	General and specialist clinicians have requested this information to facilitate an appropriate clinical choice, ensuring correct technique is performed.
Product information comes with the cannula i.e. materials used	Clinicians have highlighted the importance of materials used as some change their stiffness after a length of time at body temperature, also in some ways improve catheter/cannula performance which may be clinically advantageous and lead to longer indwell times.
OPENING & PREPARATION	
The blister packaging has clear information on where and how to open e.g. arrow or tab	It is important for Clinicians to facilitate an efficient and standardised opening and preparation technique to maintain ANTT™ (Aseptic Non-Touch Technique i.e. not touch or contaminating key parts of the cannula.)
The product can be opened maintaining sterility and safety	Clinicians have highlighted that inner packaging need to be EASY to open to facilitate ANTT™/Sterility. This will also avoid waste and enhance efficiency in performing the cannulation procedure. Also, to facilitate good practice, reducing the risk of infection and is in line with epic 3 guidelines and The Royal College of Nursing- Standards for Infusion Therapy.

CLINICAL USE	
Ease of removal of needle from protector sheath	Clinicians have identified this as important to avoid contaminating the needle shaft while removing the sheath or avoid risk of needle-stick-injury (NSI).
The bevel orientation is easy to identify	Clinicians have identified this as important to facilitate ease of insertion and improving accuracy or success at insertion and/or avoid risk of needle-stick-injury (NSI). It has been evident that the geometrical relationship of the needle & vessel (i.e. the bevel up insertion) penetrates the vessel easier than bevel down- which also has shown complications.
The cannula has secure grip and easy to handle	Clinicians have highlighted the significance of this for successful attempts of insertion and good grip to avoid accidental injury.
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	Clinicians identified this very significantly to ensure successful insertion attempt, avoid more pain and discomfort to patients and ultimately promote efficiency in practice and patient satisfaction.
The safety mechanism is easy to feel OR hear as introducer needle/stylet is disconnected from hub.	This was highlighted by Clinicians for safety and assurance that safety mechanism is activated promoting efficiency in practice AND adherence to best practice recommendations.
When the safety mechanism/ feature is activated- should not feel sharp & should not be reversible	Clinicians have experienced or have come across reversible needle-safety device, this is paramount not just for user's safety but for patient's as well. Also to adhere to EU directives and HSE.
DISPOSAL	
The outer packaging can be disposed of by environmentally sustainable means or indicating ability to recycle	Clinicians indicated that the ability to be able to recycle packaging is an important environmental factor
The introducer needle/stylet can be disposed of safely on a sharps safety disposal container with one hand.	Adherence to EU Directives and HSE

Figure 3a - Defining the clinical criteria for Safety Peripheral Intravenous Cannula

4.2.1 Criteria explanation- Exclusion

In order to capture true representation of clinical opinion, this report also aims to capture criteria that were raised at clinical conversations however, not included as final criteria when SPIVC evaluation took place.

Proposed Criteria	Rationale for exclusion
Blood Splatter – Lab Testing	Studies have identified no significant results that at insertion a scintigraphy used to measure and concluded that the risk of contracting an infectious disease from blood splashing produced is negligible (1nl = too small to cause viral or bacterial contamination) Wittmann, et al 2013).
Figure 3b	

4.3 Product Evaluation

Evaluation methodologies are defined for each and every clinical criterion. They reflect a simulated clinical environment.

Wherever possible, products were supplied in a 'ward ready' unit of issue as would be found by clinical staff on accessing a store area in their clinical environment. Where this has not been possible it was acknowledged as part of the product assessment results matrix.

The tests were formulated to move through the key aspects of product use using the NHS Clinical Evaluation Team product cycle:

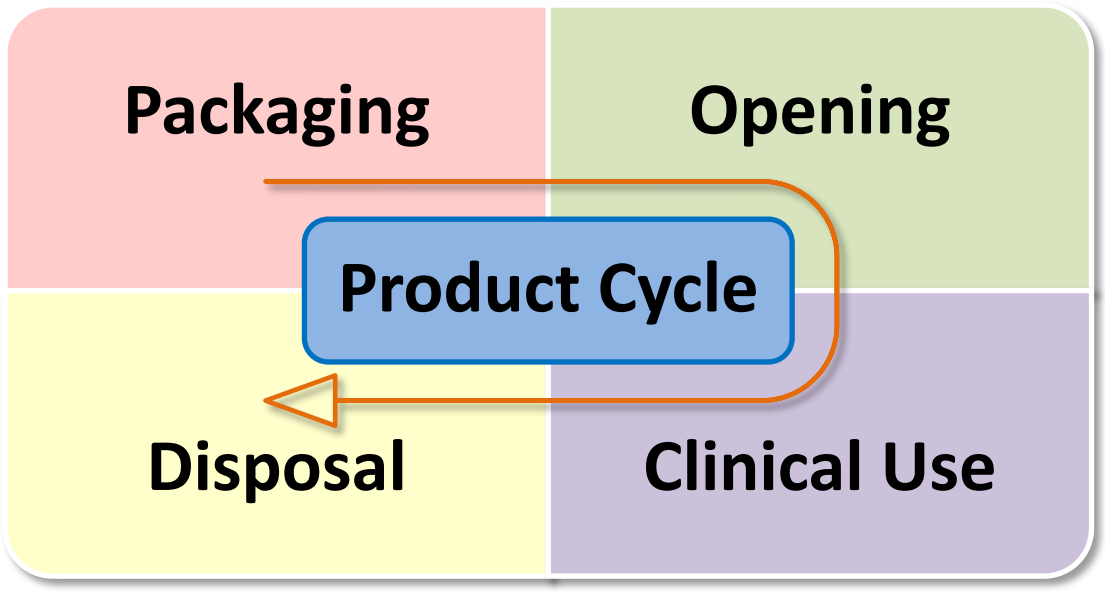


Figure 4 – NHS Clinical Evaluation Team Product Cycle

NHS clinical staffs were invited to review the products, in accordance with the developed criteria. It was not possible to 'blind' the evaluations; in the sense that the evaluators were aware of the product brand; however, the product was independently selected, in accordance with the product selection criteria in Section 2, and prepared for evaluation by colleagues who were not otherwise involved in the process.

In addition, the clinical design and acceptability of the products in clinical setting, "clinical in use evaluations" were conducted in three large acute NHS Trusts over a period of 4 months. At the simulated evaluation, each clinical evaluator entered data independently and without inter-rater comparison into their own electronic evaluation spreadsheet. Evaluations have been undertaken in a number of environments and clinical settings. Where scores are subjective for the same product then all the numerical scores from all evaluators are totalled and a mean score determined which is then converted into the star rating for our report. These were collated, reviewed and summarised by the clinical specialist lead for the project.

As part of the evaluation preparation, each evaluator was given a more detailed and product specific definition for each of the scores. Defined criteria either prompted a 'yes/no' answer, represented with a √ / X, or a score was given between 0 and 3, or 0 and 2 as follows:

Score	Meaning
0	**This does not meet the criteria**
1	**This partially meets the criteria**
2	**This meets the criteria**
3	**This exceeds the criteria**

Figure 5 – NHS Clinical Evaluation Team scoring methods

Numerical scores across all evaluators were totalled and a mean value determined which was then converted into a star rating (see matrix below) in accordance with the following table:

Point scored	Star value
0 **to 0.99**	**0 stars**
1 **to 1.24**	**1 Star**
1.25 **to 1.74**	**1.5 Stars**
1.75 **to 2.24**	**2 Stars**
2.25 **to 2.74**	**2.5 Stars**
2.75 **to 3**	**3 Stars**

Figure 6 – conversion of mean scores to star rating

The above scoring mechanisms were not followed where the criterion identified by the CET cannot reasonably exceed expectations. For example, if the clinical criterion was whether the removal of an adhesive dressing was atraumatic, with the patient reporting no pain or skin damage, then it cannot reasonably be expected that a product could exceed that criteria. Therefore, in such circumstances, the relevant criteria will be based on the scoring regime of:

a. If the criterion is a Yes/No response, the responses will be converted into aggregate percentages and then star ratings as follows:

Percentages (Yes)	Star value
0% to 24.99%	0 star
25% to 49.99%	1 star
50% to 74.99%	1.5 stars
75% to 100%	2 stars

Figure 7 – Percentage scores to star rating

b. For other subjective criteria, the responses were converted into mean scores and then star ratings as follows:

Point scored	Star value
0 to 0.49	0 stars
0.5 to 0.99	1 star
1 to 1.49	1.5 stars
1.5 to 2.00	2 stars

Figure 8 – Points scores to star rating

On the basis that clinical evaluators will be providing scores as follows:

- 0 stars – Does not meet the criteria
- 1 star – Partially meets the criteria
- 2 stars – Meets the criteria

All supplemental products used in the evaluation are in use in the NHS and available through the national catalogue (e.g. clinical sharps bin/containers, gloves,).

Evaluators were also encouraged to record comments, where they felt necessary, to provide rationale for their scoring and answers.

The results obtained have been validated by the NHS Clinical Evaluation Team moderation committee for consistency of scoring and interpretation. These results are presented in the product assessment reports herein.

5 Product Assessment Results

The following product assessment results pages illustrate the tested clinical criteria (listed vertically on the left-hand side of matrix) with the tested device (horizontally across the top of the matrix). The accompanying photographs of sample products for evaluation were taken during evaluation. The products represent the range (specified gauge only chosen for this evaluation) available through the NHS national procurement provider's framework, as of October 2017.

The product assessment results can be seen within the product matrix and have been divided into 4 sub-categories of *Safety Peripheral IV Cannula,* as follows:

- Ported
- Straight (Non-Ported)
- Straight Winged (Non-Ported)
- Integrated

6 Using the Product Assessment Results Matrix

The clinical criteria capture key clinical elements that health professionals may wish to consider when reviewing/selecting products for their own clinical practice. The report is intended as a guidance tool to aid product selection and is not intended to be a universal determinant of the clinical effectiveness of any particular product. Clinicians should therefore make their own assessments taking into account the needs of particular clinical setting. However, not all the cited clinical criteria in the report will be relevant or important in all environments. Hence clinicians may identify the criteria that most represent their clinical environment and patient demographic, and may choose to build their own hierarchy of importance to aid product(s) selection for patient outcome goals using the matrix presented in this report, their own clinical knowledge, as well as any other resources (including publications) to provide informed choice and transparency of their decision for product(s) being used.

Furthermore, the evaluation identifies potential gaps between guidelines, recommendations and clinical practice, thereby potentially providing benchmarking opportunities for further innovation and research priorities.

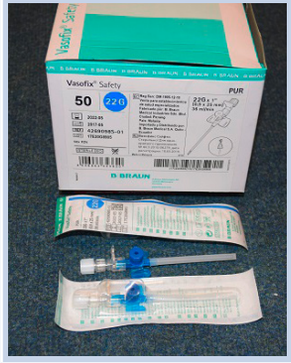
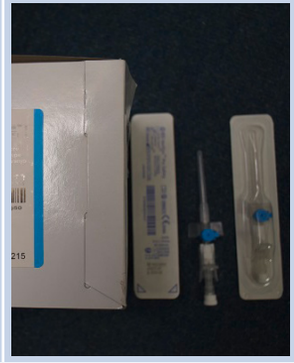
Not all clinical criteria cited in the report will be relevant or important in all environments, for example, recycling of packaging. Not all hospitals have fully implemented recycling of all appropriate waste so it may not be possible in local situations.

Clinicians may identify the criteria that most represent their clinical environment and patient demographic, and may choose to build their own hierarchy of importance to aid product(s) selection for patient outcome goals using the matrix presented in this report, their own clinical knowledge, as well as any other resources (including publications) to provide informed choice and transparency of their decision for product(s) being used.

SAFETY PERIPHERAL IV CANNULA

– Ported with Wings

NHS Clinical Evaluation Team by the NHS, for the NHS

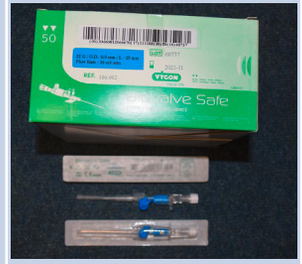
	B BRAUN MEDICAL LTD		BECTON DICKINSON UK LTD	SMITHS MEDICAL INTERNATIONAL LTD
				
NPC	FSP2155	FSP2589	FSP639	FSP3447
MPC	4269098S-01	4268091s-01	393222	7222-AI
BRAND	Vasofix Safety	Vasofix Safety	BD Venflon Pro Safety	Jelco IntuiIV Safety
BASE DESCRIPTION	Safety Cannula Ported with Wings	Safety Cannula Ported with Wings	Safety Cannula Ported with Wings	Safety Cannula Ported with Wings
SECONDARY DESCRIPTION	Blue 22G x 25mm PUR	Blue 22G x 25mm FEP	Blue 22G x 25mm PUR	Blue 22G x 25mm PUR
AVAILABLE GAUGES AND LENGTH	Orange 14G x 50mm PUR Grey 16G x 50mm PUR White 17G x 45mm PUR Green 18G x 33mm PUR Green 18G x 45mm PUR Pink 20G x 33mm PUR Blue 22G x 25mm PUR Yellow 24G x 19mm PUR	Orange 14G x 50mm FEP Grey 16G x 50mm FEP White 17G x 45mm FEP Green 18G x 33mm FEP Green 18G x 45mm FEP Pink 20G x 33mm FEP Blue 22G x 25mm FEP	Orange 14G x 45mm PUR Grey 16G x 45mm PUR Green 18G x 45mm PUR Pink 20G x 32mm PUR Blue 22G x 25mm PUR	Orange 14G x 45mm FEP & PUR Grey 16G x 45mm FEP & PUR Green 18G x 32mm FEP & PUR Green 18G x 45mm FEP & PUR Pink 20G x 32mm FEP & PUR Blue 22G x 25mm FEP & PUR
NEEDLE PENETRATION TEST REPORT	Mean=2.03 SD=0.03	Mean=1.96 SD=0.23	Mean=2.15 SD=0.04	Mean=2.3 SD=0.05
STICTION TEST	Mean=0.32 SD=0.01	Mean=1.07 SD=0.67	Mean=2.04 SD=1.13	Not Tested
OPEN OR CLOSED SYSTEM	Open	Open	Open	Open
CLINICAL CRITERIA	SCORE	SCORE	Score	Score
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 100%	★★ 100%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★½ (2.44)	★★½ (2.44)	★★½ (2.38)	★★½ (2.57)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★½ (2.63)	★★½ (2.63)	★★½ (2.38)	★★☆ (2.00)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 73%	★★ 73%	★★ (88%	★★ 100%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★½ (1.44)*	★★½ (1.44)*	★★ (2.00)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (1.86)*
Ease of removal of needle from protector sheath	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*	★★ (1.71)*
The bevel orientation is easy to identify	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*	★★ (1.86)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.75)*	★★ (1.75)*	★★ (2.00)*	★★ (2.00)*
When the safety mechanism/feature is activated- the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (2.00)*	★★ (1.75)*	★★ (1.71)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★ 75%	★★ 88%	★★ 88%	★☆ 14%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand.	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*	★★ (1.86)*

*Maximum number of 2 stars attainable

SAFETY PERIPHERAL IV CANNULA

– Ported with Wings

NHS Clinical Evaluation Team
by the NHS, for the NHS

	SMITHS MEDICAL INTERNATIONAL LTD	VYGON UK LTD	
			
NPC	FSP736	FSB1329	70962N
MPC	1722-INT(AI)	0106082	VP203211
BRAND	Protective Acuvance 2	Bio-Valve Safe	Vigmed Clip
BASE DESCRIPTION	Safety Cannula Ported with Wings	Safety Cannula Ported with Wings	Safety Cannula Ported with Wings
SECONDARY DESCRIPTION	Blue 22G x 25mm PUR	Blue 22G x 25mm PTFE	Pink 20G x 32mm PUR
AVAILABLE GAUGES AND LENGTH	Orange 14G x 45mm PUR Pink Grey 16G x 45mm PUR Green 18G x 45mm PUR 20G x 32mm PUR Blue 22G x 25mm PUR	Orange 14G x 45mm PTFE Grey 16G x 45mm PTFE White 17G x 45mm PTFE Green 18G x 45mm PTFE Pink 20G x 32mm PTFE Blue 22G x 25mm PTFE	14G x 45mm orange PUR 16G x 45mm grey PUR 17G x 45mm white PUR 18G x 32mm green PUR 18G x 45mm green PUR 20G x 32mm pink PUR 22G x 25mm blue PUR 24G x 19mm yellow PUR 24G x 19mm yellow FEP 26G x 19mm violet FEP
NEEDLE PENETRATION TEST REPORT	Mean=1.54 SD=0.42	Mean=2.55 SD=0.06	Not Tested
STICTION TEST	Mean=5.14 SD=1.98	Mean=0.38 SD=0.17	Not Tested
OPEN OR CLOSED SYSTEM	Open	Open	Open
CLINICAL CRITERIA	Score	Score	Score
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 88%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*	★★ (2.00)*	★★ (1.86)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★½ (2.63)	★★☆ (1.75)	★★☆ (2.00)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★☆ (1.88)	☆☆☆ (0.63)	★½☆ (1.71)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 100%	★☆ 38%	★☆ 29%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (1.88)*	★★ (1.63)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*	★★ (1.86)*
Ease of removal of needle from protector sheath	★★ (1.63)*	★★ (2.00)*	★★ (2.00)*
The bevel orientation is easy to identify	★★ (2.00)*	★★ (1.88)*	★★ (1.86)*
The cannula has secure grip and easy to handle	★★ (1.75)*	★★ (1.88)*	★★ (2.00)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (1.75)*	★★ (1.75)*	★★ (2.00)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	☆☆ (0.13)*	★★ (1.63)*	★★ (1.86)*
When the safety mechanism/feature is activated- the product should not feel sharp & should not be reversible	☆☆ (0.00)*	★★ (2.00)*	★★ (2.00)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	☆☆ 13%	★★ 75%	☆☆ 0%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand.	★★ (1.88)*	★★ (1.88)*	★★ (1.71)*

*Maximum number of 2 stars attainable

SAFETY PERIPHERAL IV CANNULA

– Integrated Cannula with Wings

NHS Clinical Evaluation Team
by the NHS, for the NHS

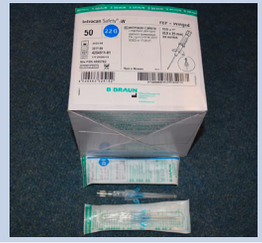
	BECTON DICKINSON UK LTD			
				
NPC	**FSP2236**	**FSP2639**	**FSP325**	**FSP319**
MPC	**383532**	**383692**	**383329**	**383328**
BRAND	**BD Nexiva Dual Port**	**BD Nexiva Diffusics**	**BD Saf-T-Intima**	**BD Saf-T-Intima**
BASE DESCRIPTION	**Safety Integrated Cannula with Wings**	**Safety Integrated Cannula with Wings**	**Safety Integrated Cannula with Wings also for Subcutaneous Infusion**	**Safety Integrated Cannula with Wings also for Subcutaneous Infusion**
SECONDARY DESCRIPTION	**Blue 22G x 25mm with Y Connector PUR**	**Blue 22G x 25mm for radiology**	**Blue 22G x 19mm with Y Connector PUR**	**Blue 22G x 19mm with PRN adapter PUR**
AVAILABLE GAUGES AND LENGTH	**Green 18G x 32mm with Y Connector PUR Pink 20G x 25mm with Y Connector PUR Blue 22G x 25mm with Y Connector PUR Yellow 24G x 19mm with Y Connector PUR**	**Green 18G x 32mm for radiology Pink 20G x 25mm for radiology Blue 22G x 25mm for radiology Yellow 24G x 19mm for radiology**	**Pink 20G x 25mm with Y Connector PUR Blue 22G x 19mm with Y Connector PUR Yellow 24G x 19mm with Y Connector PUR**	**Pink 20G x 19mm with PRN adapter PUR Blue 22G x 19mm with PRN adapter PUR Yellow 24G x 19mm with PRN adapter PUR**
NEEDLE PENETRATION TEST REPORT	**Mean=2.13 SD=0.04**	**Mean=2.12 SD=0.06**	**Not tested**	**Mean=1.31 SD=0.95**
STICTION TEST	**Unable to test**	**Unable to test**	**Not tested**	**Unable to test**
OPEN OR CLOSED SYSTEM	**Closed**	**Closed**	**Closed**	**Closed**
CLINICAL CRITERIA	**Score**	**Score**	**Score**	**Score**
The box/outer packaging clearly/visibly shows product category/type	★★ 88%	★★ 100%	★★ 75%	★★ 63%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (1.75)*	★★ (2.00)*	★★ (1.88)*	★★ (1.88)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★ (2.88)	★★★ (2.88)	★★★ (2.88)	★★★ (2.88)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★ (2.00)	★★ (2.13)	★★ (2.50)	★★ (2.38)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 63%	★★ 38%	★★ 88%	★★ 88%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
Ease of removal of needle from protector sheath	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The bevel orientation is easy to identify	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)*	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*
When the safety mechanism/ feature is activated- the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*	★★ (2.00)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★ 100%	★★ 75%	★★ 88%	★★ 100%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand.	★★ (2.00)*	★★ (2.00)*	★★ (1.50)*	★★ (1.63)*

*Maximum number of 2 stars attainable

SAFETY PERIPHERAL IV CANNULA

– Straight with Wings

NHS Clinical Evaluation Team
by the NHS, for the NHS

	B BRAUN MEDICAL LTD			BECTON DICKINSON UK LTD
				
NPC	FSP2148	FSP2586	FSP2619	FSP301
MPC	4253540-01	4254511-01	4251128-01	381923
BRAND	Introcan Safety	Introcan Safety	Introcan Safety 3	BD Insyte Autoguard Winged
BASE DESCRIPTION	Safety Cannula Straight with Wings	Safety Cannula Straight with Wings	Safety Cannula Straight with Wings	Safety Cannula Straight with Wings
SECONDARY DESCRIPTION	Blue 22G x 25mm PUR	Blue 22G x 25mm FEP	Blue 22g X 25mm PUR with blood control technology	Blue 22G x 25mm PUR
AVAILABLE GAUGES AND LENGTH	Orange 14G x 50mm PUR Grey 16G x 50mm PUR Green 18G x 45mm PUR Pink 20G x 32mm PUR Blue 22G x 25mm PUR Yellow 24G x 14mm PUR Yellow 24G x 19mm Peadiatric PUR	Orange 14G x 50mm FEP Grey 16G x 50mm FEP Green 18G x 45mm FEP Blue 22G x 25mm FEP Pink 20G x 32mm FEP Yellow 24G x 14mm FEP	Orange 14G x 50mm Grey 16G X 32mm Grey 16G X 50mm Green 18G X 32mm Green 18G X 45mm Pink 20G X 25mm Pink 20G X 32mm Pink 20G x 50mm Blue 22G X 25mm Yellow 24G X 19mm	Green 18G x 30mm PUR Pink 20G x 25mm PUR Blue 22G x 25mm PUR Yellow 24G x 19mm PUR
NEEDLE PENETRATION TEST REPORT	Mean=2.16 SD=0.09	Mean=2.15 SD=0.08	Mean=2.15 SD=0.08	Not tested
STICTION TEST	Mean=0.48 SD=0.12	Mean=1.49 SD=0.39	Mean=1.49 SD=0.39	Not tested
OPEN OR CLOSED SYSTEM	Open	Open	Closed	Open
CLINICAL CRITERIA	SCORE	SCORE	SCORE	Score
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 100%	★★ 100%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★ (2.75)	★★★ (2.75)	★★★ (2.75)	★★★ (2.88)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★½ (2.63)	★★½ (2.63)	★★★ (2.75)	★★ (1.88)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 100%	★★ 100%	★★ 100%	★★ 88%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (1.38)*	★★ (1.38)*	★★ (1.38)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
Ease of removal of needle from protector sheath	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*	★★ (1.75)*
The bevel orientation is easy to identify	★★ (1.88)*	★★ (1.88)*	★★ (1.88)*	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (1.75)*	★★ (1.75)*	★★ (2.00)*	★★ (1.63)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.88)*	★★ (1.88)*	★★ (2.00)*	★★ (1.75)*
When the safety mechanism/feature is activated the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The outer packaging clearly indicates ability to recycle.	★★ 75%	★★ 75%	★★ 75%	★★ 100%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*

*Maximum number of 2 stars attainable

SAFETY PERIPHERAL IV CANNULA

– Straight with Wings

NHS Clinical Evaluation Team
by the NHS, for the NHS

	HOSPIRA	NOVA MEDICAL SOLUTION LIMITED	SENTRA MEDICAL LTD
			
NPC	SP2079201	FSB1550	FSB1679
MPC	SP120-20-31-WT	DELTAMED-3728122	A/1114/22/P
BRAND	Supercath5	Delta med	SentraCan safety
BASE DESCRIPTION	Safety Cannula Straight with Wings	Safety Cannula Straight with wings	Safety Cannula Straight with Wings
SECONDARY DESCRIPTION	Pink 20G x 31mm	Blue 22G x 19mm PUR	Blue 22G x 25mm PUR
AVAILABLE GAUGES AND LENGTH		Orange 14G x 45mm PUR (straight) Green 18G x 45mm PUR (ported) Pink 20G x 32mm PUR (ported) Blue 24G x 19mm PUR (straight)	Orange 14G x 45mm PUR Grey 16G x 45mm PUR Green 18G x 45mm PUR Pink 20G x 32mm PUR Blue 22G x 25mm PUR Yellow 24G x 19mm PUR Violet 26G x 19mm FEP
NEEDLE PENETRATION TEST REPORT	Not Tested	Mean = 1.96 SD = 0.04	Mean=2.10 SD=0.02
STICTION TEST	Not Tested	Not Tested	Mean=0.80 SD=0.39
OPEN OR CLOSED SYSTEM	Open	Open	Open
CLINICAL CRITERIA	Score	Score	Score
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 100%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (1.86)*	★★ (2.00)*	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★½ (2.29)	★★★½ (2.38)	★★★½ (2.25)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★★½ (2.57)	★★★½ (2.38)	★★★☆ (2.00)
Clear and Visible Product information comes with the cannula i.e. materials used	★★½ 57%	★★ 75%	★★ 86%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★½☆ (1.43)	★★ (2.00)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*
Ease of removal of needle from protector sheath	★★ (1.71)*	★★☆ (0.63)*	★★ (2.00)*
The bevel orientation is easy to identify	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (1.71)*	★★½ (1.25)*	★★ (2.00)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (1.86)*	★★ (1.50)*	★★ (1.88)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★½ (1.00)*	★★½ (1.25)*	★★ (1.88)*
When the safety mechanism/feature is activated- the product should not feel sharp & should not be reversible	★★½ (1.14)*	★★ (1.50)*	★★ (2.00)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★☆ 0%	★★ 75%	★★☆ 13%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand.	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*

*Maximum number of 2 stars attainable

SAFETY PERIPHERAL IV CANNULA

– Straight

NHS Clinical Evaluation Team
by the NHS, for the NHS

	B BRAUN MEDICAL LTD	BECTON DICKINSON UK LTD	SENTRA MEDICAL LTD	SMITHS MEDICAL INTERNATIONAL LTD
				
NPC	FSP2142	FSP283	FSB1326	FSP3455
MPC	4251628-01	381823	A/1103/22/P	7130-INT
BRAND	Introcan Safety	BD Insyte Autoguard	Sentrawin	Jelco IntuilV Safety
BASE DESCRIPTION	Safety Cannula Straight	Safety Cannula Straight	Safety Cannula Straight	Safety Cannula Straight
SECONDARY DESCRIPTION	Blue 22G x 25mm PUR	Blue 22G x 25mm PUR	Blue 22G x 32mm PUR	Blue 22G x 25mm FEP
AVAILABLE GAUGES AND LENGTH	Orange 14G x 50mm PUR Grey 16G x 50mm PUR Green 18G x 45mm PUR Pink 20G x 32mm PUR Blue 22G x 25mm PUR Pink 20G x 32mm FEP Yellow 24G x 19mm Peadiatric FEP Yellow 24G x 19mm Peadiatric PUR	Orange 14G x 45m Pink 20G x 30mm Blue 22G x 25mm PUR Yellow 24G x 19mm PUR	Orange 14G x 45mm PUR Grey 16G x 45mm PUR Green 18G x 45mm PUR Violet 20G x 19mm PUR Pink 22G x 32mm PUR Blue 24G x 25mm PUR Yellow 26G x 19mm FEP	Orange 14G x 32mm FEP & PUR Orange 14G x 45mm FEP & PUR Grey 16G x 32mm FEP & PUR Grey 16G x 45mm FEP & PUR Green 18G x 32mm FEP & PUR Green 18G x 45mm FEP & PUR Pink 20G x 25mm FEP & PUR Pink 20G x 32mm FEP & PUR Pink 20G x 45mm FEP & PUR Blue 22G x 25mm FEP Blue 22G x 32mm PUR Yellow 24G x 19mm FEP & PUR
NEEDLE PENETRATION TEST REPORT	Mean=2.16 SD=0.11	Mean=1.95 SD=0.05	Mean=2.16 SD=0.11	Mean = 2.24 SD = 0.23
STICTION TEST	Mean=0.76 SD=0.18	Unable to test	Mean=0.55 SD=0.08	Not Tested
OPEN OR CLOSED SYSTEM	Open	Open	Open	Open
CLINICAL CRITERIA	SCORE	Score	Score	Score
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 100%	★★ 100%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★ (2.75)	★★★ (2.88)	★★½ (2.38)	★★★ (2.75)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★½ (2.63)	★★☆ (1.88)	★★☆ (2.00)	★★☆ (2.00)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 100%	★★ 88%	★★ 88%	★★ 100%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★½ (1.38)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*
Ease of removal of needle from protector sheath	★★ (1.88)*	★½ (1.38)*	★★ (1.88)*	★★ (2.00)*
The bevel orientation is easy to identify	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (1.75)*
The cannula has secure grip and easy to handle	★★ (2.00)*	★★ (1.88)*	★★ (1.88)*	★★ (1.88)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*	★★ (1.88)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.75)*	★★ (1.88)*	★★ (1.88)*	★★ (2.00)*
When the safety mechanism/feature is activated the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The outer packaging clearly indicates ability to recycle.	★★ 75%	★★ 88%	☆☆ 13%	☆☆ 13%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*

*Maximum number of 2 stars attainable

SAFETY PERIPHERAL IV CANNULA

– Supplier Pages

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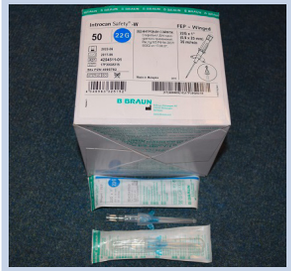
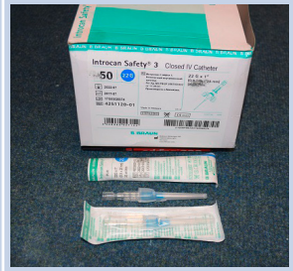
	B BRAUN MEDICAL LTD			
				
NPC	FSP2148	FSP2586	FSP2619	FSP2142
MPC	4253540-01	4254511-01	4251128-01	4251628-01
BRAND	Introcan Safety	Introcan Safety	Introcan Safety 3	Introcan Safety
BASE DESCRIPTION	Safety Cannula Straight with Wings	Safety Cannula Straight with Wings	Safety Cannula Straight with Wings	Safety Cannula Straight
SECONDARY DESCRIPTION	Blue 22G x 25mm PUR	Blue 22G x 25mm FEP	Blue 22g X 25mm PUR with blood control technology	Blue 22G x 25mm PUR
AVAILABLE GAUGES AND LENGTH	Orange 14G x 50mm PUR Grey 16G x 50mm PUR Green 18G x 45mm PUR Pink 20G x 32mm PUR Blue 22G x 25mm PUR Yellow 24G x 14mm PUR Yellow 24G x 19mm Peadiatric PUR	Orange 14G x 50mm FEP Grey 16G x 50mm FEP Green 18G x 45mm FEP Blue 22G x 25mm FEP Pink 20G x 32mm FEP Yellow 24G x 14mm FEP	Orange 14G x 50mm Grey 16G X 32mm Grey 16G X 50mm Green 18G X 32mm Green 18G X 45mm Pink 20G X 25mm Pink 20G X 32mm Pink 20G x 50mm Blue 22G X 25mm Yellow 24G X 19mm	Orange 14G x 50mm PUR Grey 16G x 50mm PUR Green 18G x 45mm PUR Pink 20G x 32mm PUR Blue 22G x 25mm PUR Pink 20G x 32mm FEP Yellow 24G x 19mm Peadiatric FEP Yellow 24G x 19mm Peadiatric PUR
NEEDLE PENETRATION TEST REPORT	Mean=2.16 SD=0.09	Mean=2.15 SD=0.08	Mean=2.15 SD=0.08	Mean=2.16 SD=0.11
STICTION TEST	Mean=0.48 SD=0.12	Mean=1.49 SD=0.39	Mean=1.49 SD=0.39	Mean=0.76 SD=0.18
OPEN OR CLOSED SYSTEM	Open	Open	Closed	Open
CLINICAL CRITERIA	SCORE	SCORE	SCORE	SCORE
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 100%	★★ 100%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★ (2.75)	★★★ (2.75)	★★★ (2.75)	★★★ (2.75)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★½ (2.63)	★★½ (2.63)	★★★ (2.75)	★★½ (2.63)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 100%	★★ 100%	★★ 100%	★★ 100%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (1.38)*	★★ (1.38)*	★★ (1.38)*	★★ (1.38)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
Ease of removal of needle from protector sheath	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*	★★ (1.88)*
The bevel orientation is easy to identify	★★ (1.88)*	★★ (1.88)*	★★ (1.88)*	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (1.75)*	★★ (1.75)*	★★ (2.00)*	★★ (2.00)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.88)*	★★ (1.88)*	★★ (2.00)*	★★ (1.75)*
When the safety mechanism/feature is activated the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The outer packaging clearly indicates ability to recycle.	★★ 75%	★★ 75%	★★ 75%	★★ 75%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*

*Maximum number of 2 stars attainable

SAFETY PERIPHERAL IV CANNULA

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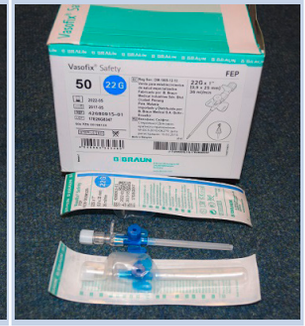
	B BRAUN MEDICAL LTD	
		
NPC	**FSP2155**	**FSP2589**
MPC	**4269098S-01**	**4268091s-01**
BRAND	**Vasofix Safety**	**Vasofix Safety**
BASE DESCRIPTION	**Safety Cannula Ported with Wings**	**Safety Cannula Ported with Wings**
SECONDARY DESCRIPTION	**Blue 22G x 25mm PUR**	**Blue 22G x 25mm FEP**
AVAILABLE GAUGES AND LENGTH	**Orange 14G x 50mm PUR Grey 16G x 50mm PUR White 17G x 45mm PUR Green 18G x 33mm PUR Green 18G x 45mm PUR Pink 20G x 33mm PUR Blue 22G x 25mm PUR Yellow 24G x 19mm PUR**	**Orange 14G x 50mm FEP Grey 16G x 50mm FEP White 17G x 45mm FEP Green 18G x 33mm FEP Green 18G x 45mm FEP Pink 20G x 33mm FEP Blue 22G x 25mm FEP**
NEEDLE PENETRATION TEST REPORT	**Mean=2.03 SD=0.03**	**Mean=1.96 SD=0.23**
STICTION TEST	**Mean=0.32 SD=0.01**	**Mean=1.07 SD=0.67**
OPEN OR CLOSED SYSTEM	**Open**	**Open**
CLINICAL CRITERIA	**SCORE**	**SCORE**
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★½ (2.44)	★★½ (2.44)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★½ (2.63)	★★½ (2.63)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 73%	★★ 73%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (1.44)*	★★ (1.44)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*
Ease of removal of needle from protector sheath	★★ (2.00)*	★★ (1.88)*
The bevel orientation is easy to identify	★★ (2.00)*	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (2.00)*	★★ (2.00)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (2.00)*	★★ (2.00)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.75)*	★★ (1.75)*
When the safety mechanism/feature is activated- the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (2.00)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★ 75%	★★ 88%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand.	★★ (2.00)*	★★ (2.00)*

*Maximum number of 2 stars attainable

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	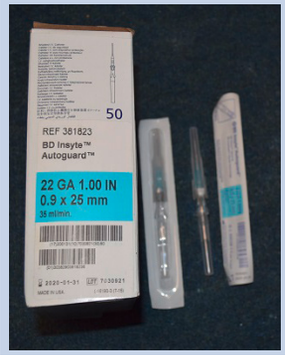		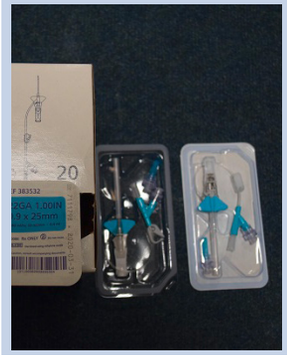	
NPC	FSP283	FSP301	FSP2236	FSP2639
MPC	381823	381923	383532	383692
BRAND	BD Insyte Autoguard	BD Insyte Autoguard Winged	BD Nexiva Dual Port	BD Nexiva Diffusics
BASE DESCRIPTION	Safety Cannula Straight	Safety Cannula Straight with Wings	Safety Integrated Cannula with Wings	Safety Integrated Cannula with Wings
SECONDARY DESCRIPTION	Blue 22G x 25mm PUR	Blue 22G x 25mm PUR	Blue 22G x 25mm with Y Connector PUR	Blue 22G x 25mm for radiology
AVAILABLE GAUGES AND LENGTH	Orange 14G x 45m Pink 20G x 30mm Blue 22G x 25mm PUR Yellow 24G x 19mm PUR	Green 18G x 30mm PUR Pink 20G x 25mm PUR Blue 22G x 25mm PUR Yellow 24G x 19mm PUR	Green 18G x 32mm with Y Connector PUR Pink 20G x 25mm with Y Connector PUR Blue 22G x 25mm with Y Connector PUR Yellow 24G x 19mm with Y Connector PUR	Green 18G x 32mm for radiology Pink 20G x 25mm for radiology Blue 22G x 25mm for radiology Yellow 24G x 19mm for radiology
NEEDLE PENETRATION TEST REPORT	Mean=1.95 SD=0.05	Not tested	Mean=2.13 SD=0.04	Mean=2.12 SD=0.06
STICTION TEST	Unable to test	Not tested	Unable to test	Unable to test
OPEN OR CLOSED SYSTEM	Open	Open	Closed	Closed
CLINICAL CRITERIA	Score	Score	Score	Score
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 100%	★★ 88%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (1.88)*	★★ (1.88)*	★★ (1.75)*	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★ (2.88)	★★★ (2.88)	★★★ (2.88)	★★★ (2.88)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★☆ (1.88)	★★☆ (1.88)	★★☆ (2.00)	★★☆ (2.13)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 88%	★★ 88%	★½ 63%	★☆ 38%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
Ease of removal of needle from protector sheath	★½ (1.38)*	★★ (1.75)*	★★ (2.00)*	★★ (2.00)*
The bevel orientation is easy to identify	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (1.88)*	★★ (1.63)*	★★ (2.00)*	★★ (2.00)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)*	★★ (1.88)*	★★ (1.88)*	★★ (2.00)*	★★ (2.00)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.88)*	★★ (1.75)*	★★ (2.00)*	★★ (2.00)*
When the safety mechanism/ feature is activated- the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★ 88%	★★ 100%	★★ 100%	★★ 75%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand.	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*

*Maximum number of 2 stars attainable

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	BECTON DICKINSON UK LTD		
			
NPC	**FSP325**	**FSP319**	**FSP639**
MPC	**383329**	**383328**	**393222**
BRAND	**BD Saf-T-Intima**	**BD Saf-T-Intima**	**BD Venflon Pro Safety**
BASE DESCRIPTION	**Safety Integrated Cannula with Wings also for Subcutaneous Infusion**	**Safety Integrated Cannula with Wings also for Subcutaneous Infusion**	**Safety Cannula Ported with Wings**
SECONDARY DESCRIPTION	**Blue 22G x 19mm with Y Connector PUR**	**Blue 22G x 19mm with PRN adapter PUR**	**Blue 22G x 25mm PUR**
AVAILABLE GAUGES AND LENGTH	**Pink 20G x 25mm with Y Connector PUR Blue 22G x 19mm with Y Connector PUR Yellow 24G x 19mm with Y Connector PUR**	**Pink 20G x 19mm with PRN adapter PUR Blue 22G x 19mm with PRN adapter PUR Yellow 24G x 19mm with PRN adapter PUR**	**Orange 14G x 45mm PUR Grey 16G x 45mm PUR Green 18G x 45mm PUR Pink 20G x 32mm PUR Blue 22G x 25mm PUR**
NEEDLE PENETRATION TEST REPORT	**Not tested**	**Mean=1.31 SD=0.95**	**Mean=2.15 SD=0.04**
STICTION TEST	**Not tested**	**Unable to test**	**Mean=2.04 SD=1.13**
OPEN OR CLOSED SYSTEM	**Closed**	**Closed**	**Open**
CLINICAL CRITERIA	**Score**	**Score**	**Score**
The box/outer packaging clearly/visibly shows product category/type	★★ 75%	★★½ 63%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (1.88)*	★★ (1.88)*	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★ (2.88)	★★★ (2.88)	★★★½ (2.38)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★★½ (2.50)	★★★½ (2.38)	★★★½ (2.38)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 88%	★★ 88%	★★ (88%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
Ease of removal of needle from protector sheath	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The bevel orientation is easy to identify	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)*	★★ (1.88)*	★★ (2.00)*	★★ (1.88)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.88)*	★★ (2.00)*	★★ (2.00)*
When the safety mechanism/feature is activated the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (2.00)*	★★ (1.75)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★ 88%	★★ 100%	★★ 88%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand	★★ (1.50)*	★★ (1.63)*	★★ (1.88)*

*Maximum number of 2 stars attainable

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	HOSPIRA
	
NPC	SP2079201
MPC	SP120-20-31-WT
BRAND	Supercath5
BASE DESCRIPTION	Safety Cannula Straight with Wings
SECONDARY DESCRIPTION	Pink 20G x 31mm
AVAILABLE GAUGES AND LENGTH	
NEEDLE PENETRATION TEST REPORT	Not Tested
STICTION TEST	Not Tested
OPEN OR CLOSED SYSTEM	Open
CLINICAL CRITERIA	Score
The box/outer packaging clearly/visibly shows product category/type	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (1.86)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★ (2.29)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★★ (2.57)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 57%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (1.43)
The product can be opened maintaining sterility and safety	★★ (2.00)*
Ease of removal of needle from protector sheath	★★ (1.71)*
The bevel orientation is easy to identify	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (1.71)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (1.86)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.00)*
When the safety mechanism/feature is activated the product should not feel sharp & should not be reversible	★★ (1.14)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★ 0%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand	★★ (2.00)*

*Maximum number of 2 stars attainable

SAFETY PERIPHERAL IV CANNULA

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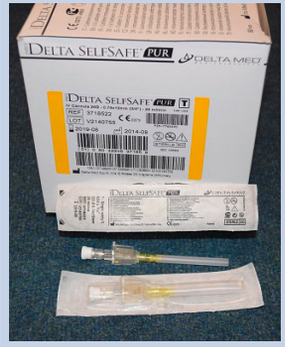
	NOVA MEDICAL SOLUTION LIMITED
	
NPC	FSB1550
MPC	DELTAMED-3728122
BRAND	Delta med
BASE DESCRIPTION	Safety Cannula Straight with wings
SECONDARY DESCRIPTION	Blue 22G x 19mm PUR
AVAILABLE GAUGES AND LENGTH	Orange 14G x 45mm PUR (straight) Green 18G x 45mm PUR (ported) Pink 20G x 32mm PUR (ported) Blue 24G x 19mm PUR (straight)
NEEDLE PENETRATION TEST REPORT	Mean = 1.96 SD = 0.04
STICTION TEST	Not Tested
OPEN OR CLOSED SYSTEM	Open
CLINICAL CRITERIA	Score
The box/outer packaging clearly/visibly shows product category/type	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★½ (2.38)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★½ (2.38)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 75%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (1.88)*
Ease of removal of needle from protector sheath	★☆ (0.63)*
The bevel orientation is easy to identify	★★ (1.88)*
The cannula has secure grip and easy to handle	★½ (1.25)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (1.50)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★½ (1.25)*
When the safety mechanism/feature is activated the product should not feel sharp & should not be reversible	★★ (1.50)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★ 75%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand	★★ (2.00)*

*Maximum number of 2 stars attainable

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	SENTRA MEDICAL LTD		
			
NPC	**FSB1326**	**FSB1679**	**FSB1130**
MPC	**A/1103/22/P**	**A/1114/22/P**	**A/1101/22/P**
BRAND	**Sentrawin**	**SentraCan safety**	**Sentraflex Safe**
BASE DESCRIPTION	**Safety Cannula Straight**	**Safety Cannula Straight with Wings**	**Safety Cannula Ported with Wings**
SECONDARY DESCRIPTION	**Blue 22G x 32mm PUR**	**Blue 22G x 25mm PUR**	**Blue 22G x 25mm PUR**
AVAILABLE GAUGES AND LENGTH	**Orange 14G x 45mm PUR Grey 16G x 45mm PUR Green 18G x 45mm PUR Violet 20G x 19mm PUR Pink 22G x 32mm PUR Blue 24G x 25mm PUR Yellow 26G x 19mm FEP**	**Orange 14G x 45mm PUR Grey 16G x 45mm PUR Green 18G x 45mm PUR Pink 20G x 32mm PUR Blue 22G x 25mm PUR Yellow 24G x 19mm PUR Violet 26G x 19mm FEP**	**Orange 14G x 45mm PUR Grey 16G x 45mm PUR Green 18G x 45mm PUR Pink 20G x 32mm PUR Blue 22G x 25mm PUR Yellow 24G x 19mm PUR Violet 26G x 19mm FEP**
NEEDLE PENETRATION TEST REPORT	**Mean=2.16 SD=0.11**	**Mean=2.10 SD=0.02**	**Mean=2.11 SD=0.17**
STICTION TEST	**Mean=0.55 SD=0.08**	**Mean=0.80 SD=0.39**	**Mean=1.30 SD=0.54**
OPEN OR CLOSED SYSTEM	**Open**	**Open**	**Open**
CLINICAL CRITERIA	**Score**	**Score**	**Score**
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 100%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★½ (2.38)	★★½ (2.25)	★★½ (2.38)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★☆ (2.00)	★★☆ (2.00)	★★☆ (2.00)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 88%	★★ 86%	★★ 86%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
Ease of removal of needle from protector sheath	★★ (1.88)*	★★ (2.00)*	★★ (2.00)*
The bevel orientation is easy to identify	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*
The cannula has secure grip and easy to handle	★★ (1.88)*	★★ (2.00)*	★★ (2.00)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (2.00)*	★★ (1.88)*	★★ (2.00)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.88)*	★★ (1.88)*	★★ (1.88)*
When the safety mechanism/feature is activated the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★ 13%	★★ 13%	★★ 13%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand	★★ (2.00)*	★★ (1.88)*	★★ (1.88)*

*Maximum number of 2 stars attainable

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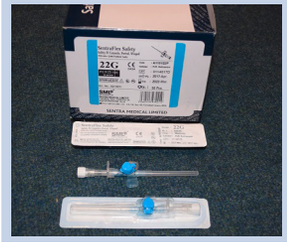
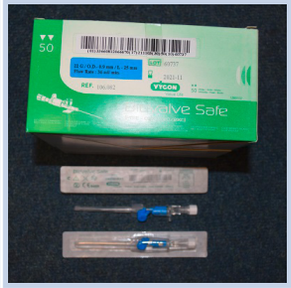
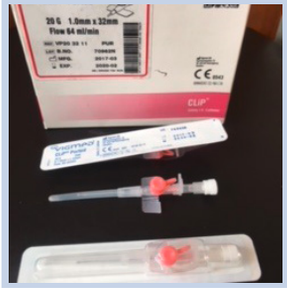
	SMITHS MEDICAL INTERNATIONAL LTD		
			
NPC	**FSP3455**	**FSP3447**	**FSP736**
MPC	**7130-INT**	**7222-AI**	**1722-INT(AI)**
BRAND	**Jelco IntuiIV Safety**	**Jelco IntuiIV Safety**	**Protective Acuvance 2**
BASE DESCRIPTION	**Safety Cannula Straight**	**Safety Cannula Ported with Wings**	**Safety Cannula Ported with Wings**
SECONDARY DESCRIPTION	**Blue 22G x 25mm FEP**	**Blue 22G x 25mm PUR**	**Blue 22G x 25mm PUR**
AVAILABLE GAUGES AND LENGTH	**Orange 14G x 32mm FEP & PUR Orange 14G x 45mm FEP & PUR Grey 16G x 32mm FEP & PUR Grey 16G x 45mm FEP & PUR Green 18G x 32mm FEP & PUR Green 18G x 45mm FEP & PUR Pink 20G x 25mm FEP & PUR Pink 20G x 32mm FEP & PUR Pink 20G x 45mm FEP & PUR Blue 22G x 25mm FEP Blue 22G x 32mm PUR Yellow 24G x 19mm FEP & PUR**	**Orange 14G x 45mm FEP & PUR Grey 16G x 45mm FEP & PUR Green 18G x 32mm FEP & PUR Green 18G x 45mm FEP & PUR Pink 20G x 32mm FEP & PUR Blue 22G x 25mm FEP & PUR**	**Orange 14G x 45mm PUR Pink Grey 16G x 45mm PUR Green 18G x 45mm PUR 20G x 32mm PUR Blue 22G x 25mm PUR**
NEEDLE PENETRATION TEST REPORT	**Mean = 2.24 SD = 0.23**	**Mean=2.3 SD=0.05**	**Mean=1.54 SD=0.42**
STICTION TEST	**Not Tested**	**Not Tested**	**Mean=5.14 SD=1.98**
OPEN OR CLOSED SYSTEM	**Open**	**Open**	**Open**
CLINICAL CRITERIA	**Score**	**Score**	**Score**
The box/outer packaging clearly/visibly shows product category/type	★★ 100%	★★ 100%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*	★★ (2.00)*	★★ (2.00)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★ (2.75)	★★½ (2.57)	★★½ (2.63)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★☆ (2.00)	★★☆ (2.00)	★★☆ (1.88)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 100%	★★ 100%	★★ 100%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (2.00)*	★★ (2.00)*	★★ (1.88)*
The product can be opened maintaining sterility and safety	★★ (1.88)*	★★ (1.86)*	★★ (2.00)*
Ease of removal of needle from protector sheath	★★ (2.00)*	★★ (1.71)*	★★ (1.63)*
The bevel orientation is easy to identify	★★ (1.75)*	★★ (2.00)*	★★ (2.00)*
The cannula has secure grip and easy to handle	★★ (1.88)*	★★ (2.00)*	★★ (1.75)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (1.88)*	★★ (1.86)*	★★ (1.75)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (2.00)*	★★ (2.00)*	☆☆ (0.13)*
When the safety mechanism/feature is activated the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (1.71)*	☆☆ (0.00)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	☆☆ 13%	☆☆ 14%	☆☆ 13%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand	★★ (2.00)*	★★ (1.86)*	★★ (1.88)*

*Maximum number of 2 stars attainable

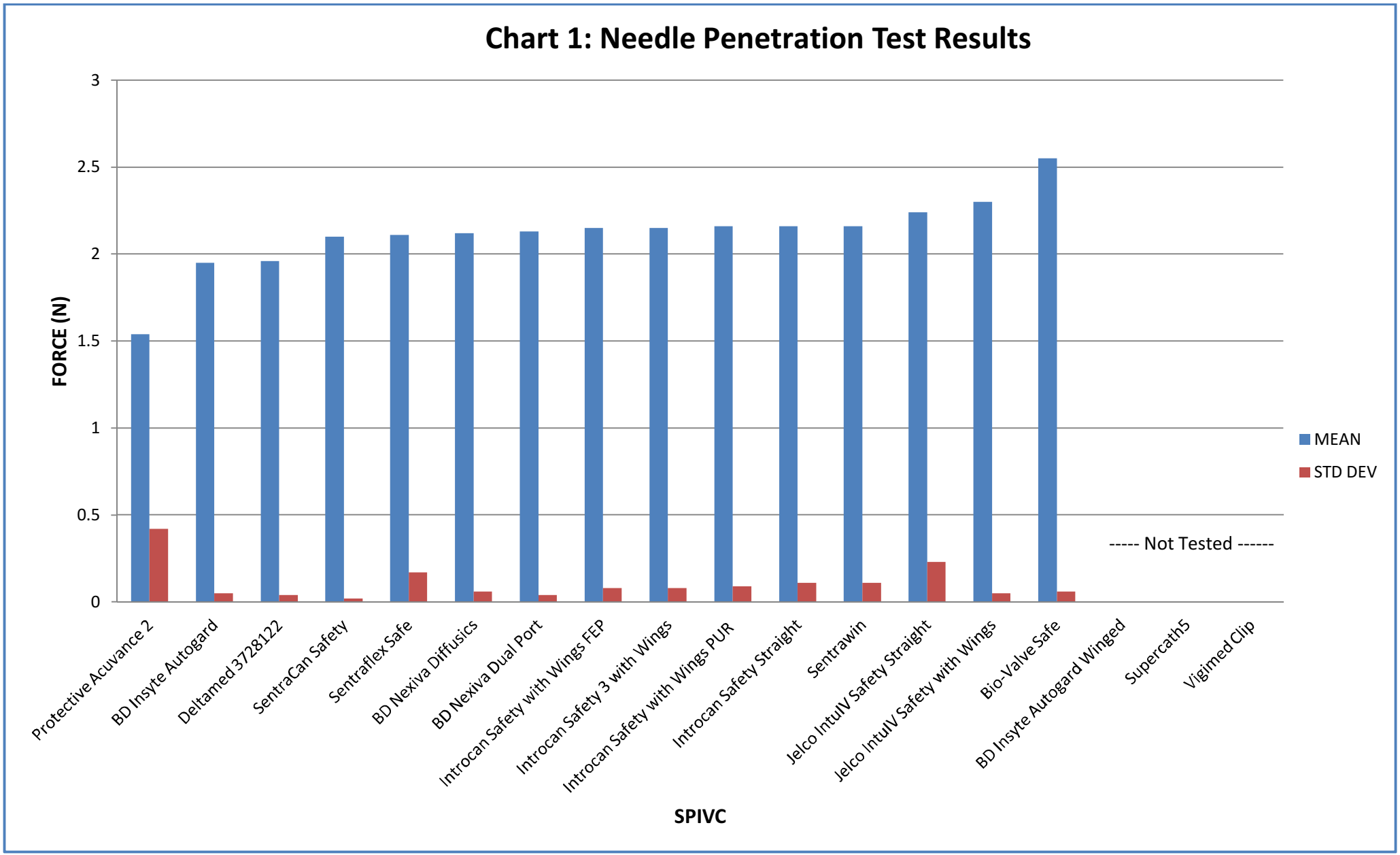
SAFETY PERIPHERAL IV CANNULA

– Supplier Pages

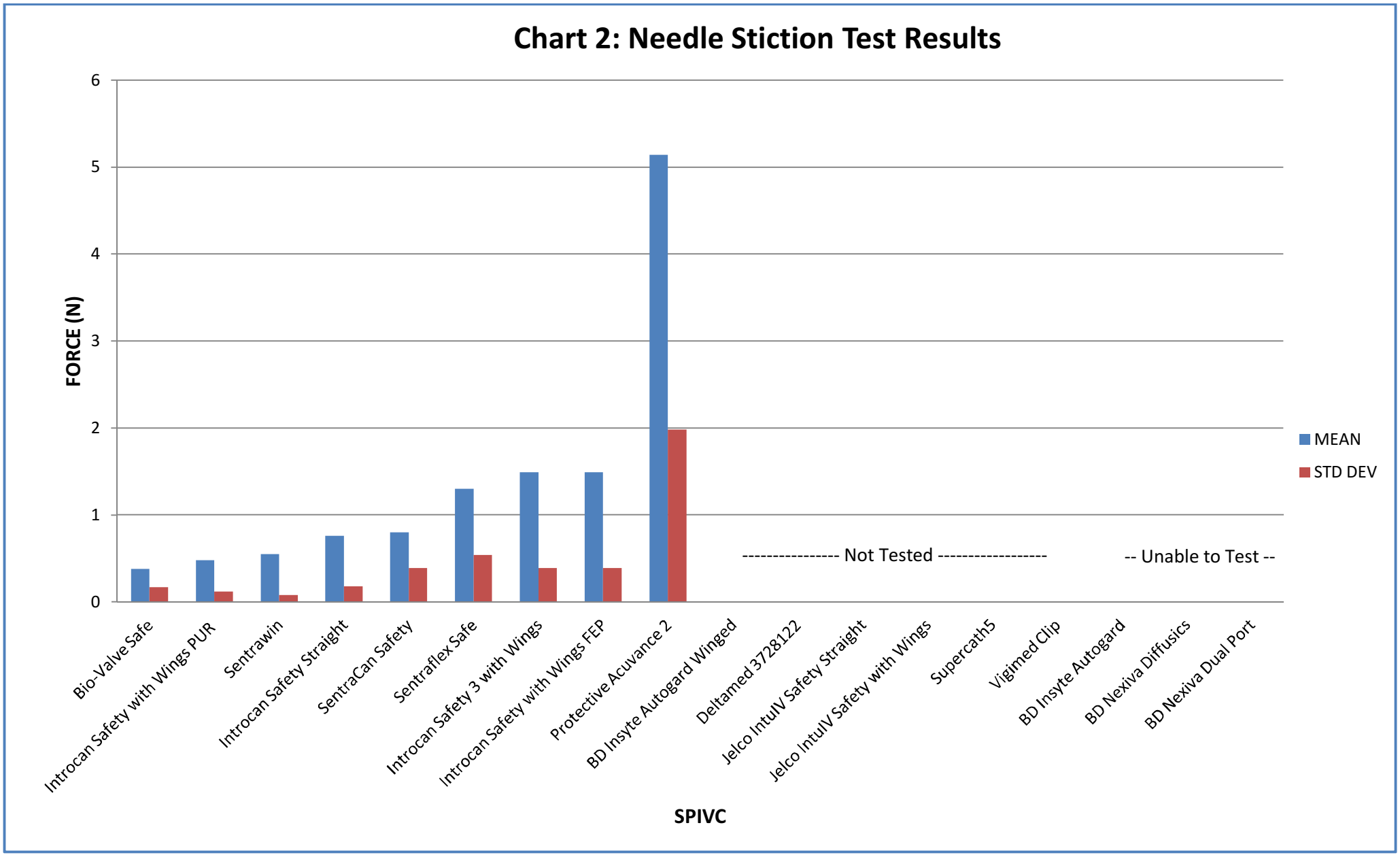
NHS Clinical Evaluation Team
by the NHS, for the NHS

	VYGON UK LTD	
		
NPC	**FSB1329**	**70962N**
MPC	**0106082**	**VP203211**
BRAND	**Bio-Valve Safe**	**Vigmed Clip**
BASE DESCRIPTION	**Safety Cannula Ported with Wings**	**Safety Cannula Ported with Wings**
SECONDARY DESCRIPTION	**Blue 22G x 25mm PTFE**	**Pink 20G x 32mm PUR**
AVAILABLE GAUGES AND LENGTH	**Orange 14G x 45mm PTFE Grey 16G x 45mm PTFE White 17G x 45mm PTFE Green 18G x 45mm PTFE Pink 20G x 32mm PTFE Blue 22G x 25mm PTFE**	**14G x 45mm orange PUR 16G x 45mm grey PUR 17G x 45mm white PUR 18G x 32mm green PUR 18G x 45mm green PUR 20G x 32mm pink PUR 22G x 25mm blue PUR 24G x 19mm yellow PUR 24G x 19mm yellow FEP 26G x 19mm violet FEP**
NEEDLE PENETRATION TEST REPORT	**Mean=2.55 SD=0.06**	**Not Tested**
STICTION TEST	**Mean=0.38 SD=0.17**	**Not Tested**
OPEN OR CLOSED SYSTEM	**Open**	**Open**
CLINICAL CRITERIA	**Score**	**Score**
The box/outer packaging clearly/visibly shows product category/type	★★ 88%	★★ 100%
The Expiration Date and Lot Number or Manufacturing date/Reference No. are clearly visible	★★ (2.00)*	★★ (1.86)*
The Cannula Gauge and Length is clearly visible without opening the individual blister packaging	★★★ (1.75)	★★★ (2.00)
There is clear instructions or user guide with the cannula i.e. instruction written on the box or a leaflet	★★★ (0.63)	★★½ (1.71)
Clear and Visible Product information comes with the cannula i.e. materials used	★★ 38%	★★ 29%
The blister packaging has clear information on where and how to open e.g. arrow or tab	★★ (1.63)*	★★ (2.00)*
The product can be opened maintaining sterility and safety	★★ (2.00)*	★★ (1.86)*
Ease of removal of needle from protector sheath	★★ (2.00)*	★★ (2.00)*
The bevel orientation is easy to identify	★★ (1.88)*	★★ (1.86)*
The cannula has secure grip and easy to handle	★★ (1.88)*	★★ (2.00)*
Easy to advance catheter/cannula into the vessel and easy to withdraw needle (or pull needle back)	★★ (1.75)*	★★ (2.00)*
The safety mechanism is easy to feel OR hear as the introducer needle/stylet is disconnected from hub.	★★ (1.63)*	★★ (1.86)*
When the safety mechanism/feature is activated the product should not feel sharp & should not be reversible	★★ (2.00)*	★★ (2.00)*
The outer packaging can be disposed of by environmentally sustainable means or clearly indicating ability to recycle	★★ 75%	★★ 0%
The introducer needle/stylet can be disposed of safely in a sharps safety disposal container with one hand	★★ (1.88)*	★★ (1.71)*

*Maximum number of 2 stars attainable



Needle Penetration Test Results = The Force required for the needle and cannula to penetrate a 0.12 mm acetate film at cross-head speed of 100 mm/min with the use of Tensometer



Needle Stiction Test Results = The Force required to initially start the withdrawal of the needle from the cannula sheath using an Instron Tensometer. The maximum initial stiction force was determined over the first 20 mm at a constant crosshead speed of 100 mm/min.

7 Further Considerations and Recommendations

7.1 Future recommendations

7.1.1 Packaging

It has become apparent in our consultations that the information on the packaging is very important for clinicians. From the matrix, a low score may be a result of information either being too small to read or not easily found or that there are too many different languages printed. For this reason, suppliers should consider making information either bigger or bolder prints and/or in colour to enhance easy identification for users, particularly in a busy ward environment to release time to care.

In addition, it was also noted that some of the individual/blister packaging are flimsy which may cause bending of the cannula shaft when stored particularly in the ambulance setting. On this note, therefore, it is recommend to suppliers to redesign such feature to a more compact and sturdy packaging to maintain shape and quality of the cannula when being stored.

7.1.2 Opening

Another notable aspect highlighted in our consultations was; for the outer packaging users prefer an opening aide on the box, such as perforation or cut away. This should be considered by suppliers who don't provide such feature and modify their product packaging. For the individual/blister packaging, users prefer an identifiable arrow with larger tabs/flaps as an "opening indicator", to make opening easier and most importantly avoid contamination of key parts of the cannula. For this reason therefore, all such packaging should be designed to ensure patient safety and assure infection prevention and control.

7.1.3 Clinical Use

Following consultation with over 300 generalist and specialist practitioners, discernible insights were identified and by nature, quite a few are negative comments and not one device was without criticism. Clinical criteria were identified, based on this consultation and methodologies identified to measure each product. These methods included simulated clinical use, retrospective clinical users' opinion and objective laboratory testing. A compelling viewpoint in relation to the safety mechanism was notable. For example, that the safety feature within the device was too big or was causing some considerable resistance requiring higher force to withdraw the needle (also, indicated in product matrices- stiction test results). Another interesting comment relative to the safety mechanism is between passive versus active devices. Passive devices mean, as the stylet (introducing needle) is withdrawn during cannulation, it is "made safe" without having to do anything to activate whereby it engages automatically. These were notably more superior to active devices, where users have to consciously activate the device during the cannulation procedure. Most of the evaluated products in this report were passive devices with the exception of the Insyte Auto guard and

Supercath 5 which required pushing of a button for activation. Another significant observation, again relative to the safety mechanism, identified by practitioners, was particularly apparent with the Protective Acuvance, to which the safety mechanism is that the needle is “blunted” and retractable. This therefore is recommended for further study and investigation for further clarity and to ascertain this observation, which could lead for further product innovation.

7.1.4 Disposal

Whilst the majority of outer packaging/boxes indicate suitability for recycling, some do not clearly indicate this. It is recommended therefore, that supplier should, wherever possible, consider this should be re-designed to ensure that recyclable materials are used and is clearly indicating on the packaging. On the other hand, it is acknowledged by CET that the individual blister packaging may be required to be waterproof and a bacterial barrier material may prevent this to be recyclable.

7.1.5 Further Considerations

At Clinical in use Evaluations, practitioners have highlighted the following which are notably relevant to further enhance the devices:

- Closed system is a more favourable option as it prevents risks of blood spillage/splatter.
- Blood control mechanism demonstrated superior advantage to both clinicians and patients eliminating risk of blood exposure.
- Flat transparent wings were suggested, for better visibility of insertion site when undertaking site surveillance for visual infusion phlebitis (VIP) score and easier application of dressings.
- Integrated system with needle-free connectors, such as valve or a shorter extension set was also found to be more favourable for clinicians- particularly in promoting infection prevention and control.

7.2 Barcodes

The CET is aware of the Scan4Safety project and is aligned with the ambitions of the programme, thereby delivering significant benefits in terms of patient safety and efficiency, to the NHS. The adoption of standards, driven by Scan4Safety, will enable patient, product and location identification and traceability from the supply chain to the patient, consequently improving the quality of care through minimising the risk of human error.

The CET will consider the inclusion of evaluation criteria relating to the presence of GS1 compliant barcodes in future reports, as following our clinical conversations, clinical staff have requested its inclusion, with further information disseminated by the CET to stakeholders in advance.

8 Disclaimer

Reports published by the NHS Clinical Evaluation Team represent general guidance, the team's opinions on products are based on clinical evaluations undertaken, using the information and clinical criteria generated from extensive stakeholder engagement in line with the team's requirements and evaluation pathway. Reports will be reviewed and updated at the team's discretion, as deemed appropriate, to reflect any changes.

You should make your own assessment and rely on the opinions expressed in the reports by the NHS Clinical Evaluation Team

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Reports are accurate at the time of publication, any recommendations or best practice guidance should be checked for updates.

9 Acknowledgements

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The team would also like to acknowledge the inspiration of Mandie Sunderland who saw this opportunity and who, through her personal drive and enthusiasm, has ensured that the clinical voice and the need for quality, safety and value throughout the NHS has been heard.

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11 References

Alexandrou E., Ray-Barruel G., Carr PJ et al. (2015) International prevalence of the use of peripheral intravenous catheters. *Journal of Hospital Medicine*; **10**(8):530-533. Available at: http://doi.org/10.1002/jhm.2389.

Bausone-Gazda D., Cheryl A., Shelley-Ann WM., (2010). A randomized controlled trial to compare the complications of 2 peripheral intravenous catheter-stabilization systems. Journal of Infusion Nursing, 33 (6) : 371-384.

Barton, A. (2018) Clinical use of closed-system safety peripheral intravenous cannulas. *British Journal of Nursing;* **27**(8) (IV Therapy Supplement): S22-S27.

Carr PJ., Rippey, JC., Cooke, ML. et al (2016) Development of a clinical prediction rule to improve peripheral intravenous cannulae first attempt success in the emergency department and reduce post insertion failure rates: the Vascular Access Decisions in the Emergency Room (VADER) study protocol. *British Medical Journal;* **6** (2) Available at: http://bmjopen.bmj.com/content/6/2/e0091696 (Accessed 10/09/2017).

Centres for Disease Control and Prevention (2011) Available at: www.cdc.gov

Council of the European Union. Council Directive 2010/32.EU. (2010) Implementing the framework agreement on prevention from sharp injuries in the hospital and healthcare sector concluded by HOSPEEM and EPSU Available at: http://osha.europa.eu/en/legislation/directives/sector-specific-and-worker-related-provisions/osh-directive/council-directive-2010-32-eu

Dougherty L. and Lister, S. (eds) (2015) The Royal Marsden Manual of Clinical Nursing Procedures, 9th ed. John Wiley and Sons, Chichester.

Hallam C., Weston V., Denton A., et al (2016) Development of the UK Vessel Health and Preservation (VHP) framework: a multi-organization collaborative. *Journal of Infection prevention. 1-8 doi.10.1177/1757177416627752.*

Loveday H., Wilson J., Pratt R., et al (2014a) epic 3: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *Journal of Hospital Infection;* **86** (suppl 1): S1-S70.

Moureau N. et al. (2014) Vessel Health and Preservation (Part 1): a new evidence based approach to vascular access selection and management. *Journal of Vascular Access,* **13**, pp351-356, doi:10.5301/vja.5000042.

O'Grady N.P., Alexander M., Burns L.A., et al (2011) Guidelines for the prevention of intravascular catheter-related infections. *Clinical infectious diseases;* **52**(9): e162-e193.

Rivera A., et al. (2005) The history of peripheral intravenous catheters: How little plastic tubes revolutionized medicine. *Acta Anaesthesiologica Belgica*, **56**:271-282.

Royal College of Nursing: Standards for Infusion therapy. 4th edn. London: RCN; 2016.

Royal College of Nursing (2011) *Sharps safety RCN guidance to support implementation of the EU Directive 2010/32/EU on the prevention of sharps injuries in the health care sector,* London: RCN.

Shaw SJ. (2017). Using the Vessel Health and Preservation framework to enhance vein assessment and vascular access selection. *Nursing Standard,***31**(46): 50-63. Available at: https://doi.org/10.7748/ns.2017.e10741.

Seiberlich, LE., Keay, V., Kallos, S., et al. (2015) Clinical Performance of a new blood control peripheral intravenous catheter: A prospective, randomized, controlled study. *International Emergency Nursing.* Available at: http://sx.doi.org/10.1016/j.ienj.2015.08.005.

The Royal Marsden Hospital (2011) *The Royal Marsden Hospital Manual of Clinical Procedures (7th edition),* Chichester: Wiley Blackwell.

Tidy C. (2014) Different levels of evidence. Evidence based medicine. Available at: https://tinyurl.com/y8eag92c.

Wittmann A., Kover, J., Kralj, N., et al (2013) Mucocutaneous blood contact: Blood release behaviour of safety peripheral intravenous catheters. *American Journal of Infection Control*; **41**(12) pp 1214-1217. Available at: http://www.sciencedirect.com/science/article/pii/S0196655313002939 (Accessed 22/10/2017).

‘Quality, safety and value are at the heart of our work and it’s important that we use our clinical experience to deliver high standards of care while reducing cost and waste in the NHS.’

Mandie Sunderland
Chair, Clinical Reference Board
(Governing body of the NHS Clinical Evaluation Team)