

OCCUPATIONAL EXPOSURES TO BLOOD AND BODY FLUIDS RECOMMENDED PRACTICES FOR PREVENTING HOLLOW-BORE NEEDLESTICK INJURIES

Principle Guidelines:

Queensland Health. Infection Control Guidelines. Appendix P3: Management of blood and body fluid exposure. 2001. Queensland Government: Brisbane. http://www.health.qld.gov.au/chrisp/ic_guidelines/P3_Revision_April09.pdf (updated 2006)

Centers for Disease Control and Prevention. Workbook for Designing, Implementing and Evaluating a Sharp Injury Prevention Program. 2004. US Department of Health and Human Services: Atlanta. <http://www.cdc.gov/sharpssafety/index.html>

Rationale:

Needlestick injury (NSI) with hollow-bore devices is a frequent cause of healthcare worker (HCW) occupational exposure to blood borne viruses. Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and Human Immunodeficiency Virus (HIV) are the most commonly transmitted diseases through occupational injury. Between February 2002 and December 2005, 5,379 occupational exposures were reported by 19 Queensland Health hospitals contributing data to the CHRISP State aggregate data set. Approximately 68% were percutaneous exposures (needlestick/sharps injury) of which 55% were due to hollow-bore needles.

A range of safety devices is now available however, there are relatively few published studies that systematically assess the effectiveness of safety devices in reducing percutaneous injuries (other than those involving needle-free intravenous [IV] systems). "Reports that are available show considerable variation in study methodology, measurement of outcomes, and efficacy. Also there are apparent differences in efficacy by type of device." ¹

Analysis of the results of a ten-year study at a large Queensland tertiary referral hospital revealed that two hollow-bore devices were implicated in over 90% of NSI.² These two devices were needles and syringes and steel-winged infusion sets. Strategies such as HCW education programs, a non-recapping policy, and improved sharps containers had little impact on the NSI rate over the term of the study. As these strategies had failed it was decided that devices with engineering enhancements should be trialled.

In 2004, the Centre for Healthcare Related Infection Surveillance and Prevention (CHRISP) undertook a project to evaluate the effect of introducing safety devices to prevent hollow-bore NSI. The primary interventions of the project were implementation of a retractable needle/syringe, removal where possible, of steel-winged infusion sets ('butterflies'), and implementation of a safety steel-winged infusion set where removal was not possible. User acceptability of devices was a key consideration in product selection. The two-year trial resulted in an overall reduction of reported injuries related to disposable needle/syringes and steel-winged infusion sets by 50%, compared with the pre-trial period. The outcomes of this project will be published in the near future.

Based on the results of this project, CHRISP has recommended the introduction of a range of strategies to reduce NSI related to hollow-bore devices:

Recommendation 1

Replacement of conventional needles and syringes for intramuscular and subcutaneous injections with the VanishPoint™ retractable syringes with pre-attached needle. There is an extensive range of syringe volume and needle sizes on SOA.

Recommendation 2

Replacement of steel-winged infusion sets ('butterflies') with a safety system for subcutaneous and intravenous infusions

Recommendation 3

Removal of steel-winged needles/sets ('butterflies') for both intravenous and subcutaneous purposes other than infusions e.g. blood collection

Recommendation 4

Utilisation of needle-free intravenous access systems

Recommendation 5

Utilisation of single-use only blood collection tube holders

Recommendation 6

Utilisation of safety intravenous cannula for peripheral vein catheterisation.

Definition:

Hollow-bore needles include those previously referred to as 'hypodermic', which are needles with a lumen and bevelled edge used for collecting blood, or for the administration of parenteral (intravenous, intramuscular and subcutaneous) substances. Similar devices can be used for other purposes such as bone marrow and cerebrospinal fluid (CSF) aspiration. As hollow-bore needles contain a lumen and carry a larger volume of blood than those needles without a lumen – those that are solid (e.g. suture needles), they induce a much greater risk of transmission of blood borne viruses in the event of a NSI.

Process:

This document outlines recommended practices to prevent hollow-bore NSIs. This information should be incorporated into existing policies and procedures related to usage of hollow-bore needles including Standard Precautions, needlestick injury prevention, medication administration, venepuncture, intravascular catheterisation, and specimen collection including phlebotomy.

Recommended Indicators:

Process Indicator

1. 100% of healthcare workers will use the safety devices in accordance with the Recommended Practices six-months post implementation

Outcome Indicators

2. 30% - 50% reduction in the number of disposable needle/syringe NSI two-years post-implementation
3. 30% - 50% reduction in the number of steel-winged infusion set NSI two-years post-implementation

Recommended Practices:

- *Product names are used for explanation purposes only and are not an endorsement of any specific company.*
 - *For issues where there is insufficient evidence or variation in opinion, the Queensland Health Infection Control Expert Advisory Group (ICEAG) has endorsed the recommended practice(s) within this document.*
 - *Recommendations will be updated as new information becomes available.*
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- The introduction of safety devices should not replace existing needlestick (NSI) prevention strategies such as work practice controls (e.g. care in handling sharp devices), personal protective equipment, educational programs, avoidance of recapping, and sharps disposal systems.
 - Based on the *hierarchy of controls* concept, the priorities for sharps injury prevention are:
 1. Eliminate and reduce the use of needles and other sharps where possible. Examples include -
 - Using alternate routes for medication delivery and vaccination when available and safe for patient care.
 - Reviewing specimen collection systems to consolidate and eliminate unnecessary punctures.
 - Needle-Free Intravenous Access Systems.
 2. Isolate the hazard, thereby protecting an otherwise exposed sharp, through the use of engineering control, for example -
 - Sharps disposal containers
 - Needles and other sharp devices with an integrated engineered sharps injury prevention feature.
 3. Work practice controls and personal protective equipment such as:
 - Using instruments, rather than fingers, to grasp needles, retract tissue, and load/unload needles and scalpels.
 - Avoiding hand-to-hand passage of sharp instruments by using a dish/basin or *neutral zone*.
 - Other factors such as a strong safety culture including systems approaches to patient safety, a blame-free environment for reporting sharps injuries, event analysis to identify possible contributory factors, and healthcare worker acceptance have been identified as contributing to reductions in sharps related injuries.
 - The Centers for Disease Control and Prevention (CDC) suggests that no single safety device or strategy works the same in every facility.¹ Therefore employers must evaluate their own programs in line with the [Implementation Checklist](#) and the *hierarchy of controls*.

- The estimated reduction in hollow-bore NSI will only be achieved if all the recommended practices are implemented (refer Recommended Indicators).
- In order to gain high levels of compliance with the use of safety devices, it is necessary to remove all equipment that might allow staff to deviate from the Recommended Practices.
- Only one type of each device must be selected due to the differing methods of activation of the safety feature i.e. either the Baxter International, Inc. Interlink® or Cardinal Health Alaris® Smartsite® intravenous access system (refer [Safety Device Ordering Details](#)).
- Where possible, all conventional needle/syringes should be replaced with a retractable syringe with pre-attached needle.
- Retractable syringes are not suitable for some purposes, for example:
 - Blood collection
 - Blood collection tube holders should be used for venepuncture in preference to a conventional needle and syringe (also refer Recommended Practices for Blood Collection).
 - Aspiration
 - Administration of local anaesthetic (LA) >3 mL
 - Most procedures require no more than 1-2 mL of LA for effective anaesthesia.
 - Using low volume syringes also reduces the chance of an excess volume being used; excessive volume may cause more pain.
 - Pre-packed medications +/- administration needle
 - Procedures where non-retractable needles form part of the procedure kit/pack.
- Some conventional needles will still be required:
 - 18 gauge (blunt) needles for drawing up medication however, their use will be reduced as the retractable syringe comes with a pre-attached needle.
 - 21 gauge needles for administration of medication into infusion bags and blood collection (only if necessary).
 - 27 gauge needles for administration of LA >3 mL
 - Whilst 25 gauge needles are most commonly used by practitioners for LA administration, fine (27-30 gauge) and long (>25 mm) needles are recommended to minimise the pain of local anaesthetic administration.
- Post-implementation observational rounds should be undertaken regularly to determine that safety devices are available and being used correctly. The rounds can also be utilised to encourage staff to report issues related to safety devices and other sharps injury hazards.
- Three- to six-monthly audits of a random sample of sharps containers could be considered if it is perceived staff are not activating the safety devices.
 - If activation rates are sub-optimal (i.e. <95% activation), a report including photographic evidence, should be provided to the Nurse Unit Manager/Unit Director.
 - Staff should be interviewed to determine that device faults are not a contributory factor.
 - Additional education and training may be required.

- Multi-disciplinary education in relation to the introduction of safety devices should be incorporated into general information regarding sharps awareness including:
 - Standard Precautions
 - Hepatitis B vaccination
 - Transmission of blood borne viruses
 - Sharps injury prevention
 - Sharps disposal procedures
 - Management of an occupational exposure (refer [Sharps Awareness Presentation](#))
- Education and training should be provided on orientation, annually and when new devices are introduced.
 - Training should be tailored to the audience needs and should include discussion of why the change is proposed. It is useful to incorporate local information on sharps injuries and sharps injury prevention in the training, for example:
 - Number of sharps injuries in the last year or several years,
 - Occupations, devices and procedures involved, and
 - The most common ways injuries occur in the facility.
 - If training will be primarily by lecture, the presentation of case studies of exposures can assist the trainer to engage the audience in discussion of how to prevent the injury.
 - Training must include a *hands-on* component to develop the psychomotor skills required to activate the safety devices.
- Training needs to be ongoing to capture new staff, as well as provide refresher training to those already trained.
- Students, agency staff, and contractors need to be orientated to the specific safety devices used in the facility.
- Evidence of training must be maintained.
- Utilise other mechanisms to promote sharps injury prevention including:
 - Locate posters reinforcing key messages in relation to sharps injury prevention in clinical areas (see [sample poster](#)).
 - Articles in newsletters
 - Computer screensavers
 - Electronic communication tools such as email and websites
 - Staff meetings
 - Foyer displays
 - Competitions, quizzes
 - Sharps Prevention Awareness Day
 - Medical Industry material including CDs, DVDs, posters, websites (however, Internet access is usually required). A list of industry contacts for all of the recommended safety devices is included as Attachment 1.

- A process for notification of the occurrence of an occupational exposure must be in place within each facility (refer [Queensland Health Infection Control Guidelines Appendix P3](#) and [Investigation of Occupational Exposures to Blood or Body Fluid](#)).
- In order to report incidence rates and adequately measure effectiveness of interventions, facilities need to collect accurate numerator (e.g. occupational exposures to blood and body fluids) and denominator data (e.g. full-time-equivalent [FTE] staff) (also refer [Section 4](#), CHRISP Surveillance Manual).
- Data on sharps injuries need to be analysed and interpreted so it will be meaningful for prevention planning.
 - The date of introduction of safety devices must be recorded on the surveillance plan to measure the effectiveness of the interventions.
 - Post-implementation, occupational exposures should be analysed and reported monthly (depending on frequency of incidents).
 - Occupational exposures must be investigated to identify possible contributory factors and develop an action plan to address these (also refer [Investigation of Occupational Exposures to Blood or Body Fluid](#)). Further education and training may be necessary.
 - If the Event Analysis identified a safety device as a contributory factor, a clinical product complaint process must be completed (refer [Recommended Practice for Product Complaint Management](#)).
 - Annual rates of occupational exposures should be calculated using the number of full-time-equivalent (FTE) positions for each year as the denominator e.g. exposure type per 100 FTE.
- Surveillance of occupational exposures is distinct from other types of surveillance. It is essentially a passive process that relies on the exposed staff member formally reporting the incident. It is therefore not possible to know how representative these data are of all incidents that actually occur in a facility. A staff member's decision to report an incident may be influenced by a number of factors including perception of risk, knowledge of modes of infection transmission, belief about a source patient's infection status and previous experience with local incident management systems.
 - It is therefore important to note that an increase in numbers may be a reflection of increased reporting as opposed to increased incidents of NSI.
 - A baseline assessment followed by periodic reviews (e.g. every two to three years) should be used to measure reporting compliance and healthcare worker knowledge of procedures for reporting NSI e.g. standardised, anonymous questionnaire survey to determine the true reporting rate of NSI (refer [Sample Survey](#)).

Recommendation 1

- The [VanishPoint™ retractable syringe/needles](#) should be used for all subcutaneous and intramuscular injections.
 - The emphasis needs to be on complete removal of non-essential administration needles in order to achieve a significant reduction in hollow-bore NSI.
- The VanishPoint™ syringe incorporates automatic retraction of the needle into the barrel of the syringe, after the plunger is fully depressed (also refer Retractable Syringe Posters [1](#) & [2](#)).
- The following range of VanishPoint™ syringes is available on Queensland Health Standing Offer Arrangement (QH SOA) 234:
 - 50 unit (0.5 mL) insulin syringe (pending successful evaluation)
 - 100 unit (1 mL) insulin syringe
 - 1 mL tuberculin (non-insulin) syringe (available on exemption only)
 - 3 mL syringe
 - A range of needle gauges and lengths are available.
 - 5 mL and 10 mL retractable syringes have not been made available on QH SOA 234.
 - Standard (conventional) syringes will still be available.
- The VanishPoint™ needle is pre-attached therefore drawing up and administration of medication occurs with the same needle.
 - Care should be taken to avoid damage to the needle tip (i.e. do not place the tip forcibly against a hard surface such as glass).
- The retraction mechanism should be activated as part of the normal action of giving the injection i.e. the needle is retracted when the plunger is fully depressed into the barrel of the syringe.
- Retraction of the needle needs to occur whilst still in the patient.
 - 'In-patient' needle retraction ensures administration of the complete dose of medication, as well as reduces the risk of NSI.
 - For more information refer to the [Retractable Syringe Tip Sheet](#)
- Retractable syringes are not suitable for aspiration, venepuncture, blood gas or blood culture collection (also refer General Recommended Practices).
- Retractable syringes should be disposed of in a sharps container after use (refer Recommended Practice for Sharps Disposal).

Recommendation 2

Winged Infusion Sets for Subcutaneous (SC) and Intravenous (IV) Infusions

- The [Becton Dickinson \(BD\) Saf-T-Intima™ Closed IV Catheter System](#) should be used for:
 - the administration of all continuous and intermittent infusions of subcutaneous medications and fluids
 - vascular access where a smaller, shorter catheter is indicated.
- This device offers a telescoping safety shield that encases the needle as it is withdrawn from the catheter to protect against NSI.
- According to information provided by the company, the catheter is made from material which is more comfortable and associated with fewer complications for the patient.
- The BD Saf-T-Intima™ catheter is not currently listed for subcutaneous use with the Therapeutic Goods Administration (TGA). However, it is accepted practice worldwide to use a winged infusion set for intermittent and continuous infusions of subcutaneous medications and fluids.
- The following procedure is recommended for the insertion of subcutaneous catheters:
Insertion of Indwelling Subcutaneous Catheters
 - Also refer local hospital procedure for insertion of subcutaneous catheters.
 - Hair at the insertion site should only be removed (prior to antiseptic application), using clippers (not shaved) to improve adherence of the dressing.
 - The skin should be physically cleaned (if necessary) prior to applying the antiseptic solution and inserting the catheter.
 - Wash hands and forearms for sixty seconds (clinical handwash) prior to insertion of the device.
 - Because the device will be left indwelling, the skin should be prepped with an antiseptic with residual activity e.g. a solution containing 0.5% to 2% chlorhexidine gluconate (CHG) in $\geq 70\%$ ethyl or isopropyl alcohol (alcoholic chlorhexidine).
 - The solution should be applied vigorously to an area of skin approximately 15cm in diameter, in a circular motion beginning in the centre of the proposed site and moving outward, for at least 30 seconds.
 - The antiseptic must be allowed to air dry completely prior to inserting the catheter; do not wipe or blot.
 - Palpation of the insertion site should not be performed after the application of antiseptic, unless aseptic technique is maintained.
 - Utilise an aseptic technique during insertion of the catheter
 - Once inserted, the device should be covered with a sterile, transparent, semi-permeable, self-adhesive, polyurethane dressing.
 - Check insertion site each shift. Resite if:
 - evidence of inflammation or infection AND
 - every 7 days (inpatients only).

Recommendation 3

Winged Infusion Needles for SC and IV Use other than Infusions

- Conventional steel-winged needles ('butterflies') for both intravenous and subcutaneous purposes other than infusions (e.g. routine blood collection), should be withdrawn from use.
- The emphasis needs to be on complete removal of the device rather than simply implementing a safety steel-winged infusion or blood collection set.
 - If a steel-winged blood collection set is deemed necessary, a safety device must be used.
 - A procedure needs to be instituted to ensure safety steel-winged blood collection sets are only supplied to areas authorised to use them.
 - There is currently no steel-winged blood collection set with safety features on Queensland Health Standing Offer Arrangement (QH SOA). In the interim, facilities should select one of the following safety devices; each has a different mechanism of activation which needs to be considered when evaluating the device:
 - [Terumo® Surshield™ Safety Winged Blood Collection Set](#) or
 - [Becton Dickinson \(BD\) Vacutainer® Safety-Lok™ Blood Collection Set](#) or
 - [Becton Dickinson \(BD\) Vacutainer® Push Button Blood Collection Set](#)
 - Factors to consider when selecting a safety device include:
 - Ideally the device should be passively activated
 - The safety feature should be -
 - simple and obvious in operation
 - an integral part of the device
 - cost-effective.
 - Hands must remain behind the sharp during activation
 - The device must be activated with one hand.
- Conventional steel-winged needles/sets may be used where there is no contact with patient tissue i.e. administering medication into sterile intravenous fluid (Pharmacy).

Recommendation 4

Needle-Free Intravenous Access Systems

- Needle-free systems should be used to access intravascular devices.
- It is acknowledged that NSI that occur from needles used to access intravenous lines are low risk however, uniformity of access leads to less confusion and increased compliance with other safety devices.
- There are currently two types of devices on QH SOA 27:
 - [Cardinal Health Alaris® Smartsite®](#) (mechanical valve) Needle-Free System
 - [Interlink® IV Needleless Access System](#) (split septum port)
- Individual facilities need to determine which system to implement; the local Infection Control Team and Clinical Product Committee should be involved in the decision-making process. Factors to consider when selecting a system should include:
 - Compatibility with needle-free accessory components already in existence
 - User acceptability of the products
 - Ease of compliance with manufacturer guidelines
 - Cost of the devices including implementation
 - Ability of the distributor to provide education and resources including ongoing education.
- Adhere to manufacturer's recommendations when accessing needle-free intravenous administration systems.
- All persons handling or entering the system must first wash their hands or use an alcohol-based waterless cleanser.
- All intravenous access ports must be vigorously cleaned with a sterile, single-use 70% alcohol-impregnated swab and allowed to dry prior to accessing the system.
 - The injection surface of the access device must be thoroughly cleaned before each injection
 - The intravenous port must be accessed with a sterile single-use device.

Recommendation 5

- Standard Precautions apply for all blood collection procedures.
- The primary device used for blood collection in adults should be a blood tube collection holder.
 - This system allows the correct quantity of blood to enter the blood tube without secondary handling of the specimen.
- The following blood collection tube holders are available:
 - [VanishPoint™ blood collection tube holder](#) with automated retraction technology:
 - Obtain via normal facility ordering processes.
 - This system is compatible with standard, multi-sample blood collection needles.
 - The device allows users to keep both hands behind the needle when activating the safety mechanism.
 - Once the last tube has been removed and while the needle is still in the patient's vein, the device is activated by closing the end cap to automatically retract the needle into the tube holder.
 - At the completion of the specimen collection the entire device should be immediately disposed of in a sharps container.
 - [Becton Dickinson \(BD\) Vacutainer® One-Use Holder](#):
 - Available on QHPSS SOA 620.
 - These devices must be single use only as disassembly of devices can cause injury.
 - [Becton Dickinson \(BD\) Pronto™ Quick Release Tube Holder](#):
 - Available on QHPSS SOA 620.
 - The tube holder enables the multi-sample needle to be detached by depressing the button on the base of the holder.
 - Multi-use blood tube collection holders with a quick release mechanism are acceptable as long as:
 - the needle is removed using the release mechanism and without manual manipulation of the needle,
 - an approved method for decontamination has been documented and is followed (the holder can be re-used at least 200 times),
 - it is recommended that the multi-use device only be used where blood collection is the primary activity undertaken e.g. Queensland Health Pathology Service (QHPS).
- Where a syringe and needle is used for a difficult collection, the needle should be removed from the syringe with a needle removal device prior to filling the blood tube. The blood tube lid should not be pierced with a needle (National Association of Testing Authorities [NATA] 2000).
- Steel-winged needles/sets should not be used for routine blood collection.
 - If there is a need to use a steel-winged needle in a clinical setting a safety device should be used (refer to Recommendation 3).
- Further work/technology needs to occur in relation to safe collection of arterial blood gases and blood cultures. If arterial blood can be collected from a line without a sharp, this is the preferred method of collection.

Recommendation 6

Safety Peripheral Intravenous Catheters

- A safety intravenous cannula should be used for peripheral vein cannulation.
- Few devices with passive activation have been marketed.
 - A passive safety feature is one that requires no action by the user.
- A safety intravenous cannula for peripheral vein catheterisation is available on QH SOA 728
 - Becton Dickinson (BD) [Insyte™ Autoguard™ Shielded IV Catheter](#)
 - The device requires the user to engage the safety feature by pressing a white button on the shield, this mechanism retracts the needle into the safety barrel.
 - For further information on insertion and management of peripheral intravenous catheters (PIVC) refer to the [Recommended Practices for the Insertion and Management of PIVC](#)

Other Recommendations

Injector Pens

- Injector pens, specifically insulin injector pens, are to be used for patient self-administration only.
- HCWs must not use injector pens to administer medication unless they have had training on the specific device.
- If a patient who usually self-administers insulin using an injector pen is compromised due to illness or injury, a single-use retractable syringe should be used.
- Also refer CHRISP Advisory 02/06 at http://www.health.qld.gov.au/chrisp/resources/advisory_inj_pen.pdf

Sharps Disposal

- All hollow-bore needles including those with safety features must be disposed of into an approved sharps disposal container
 - Australian Standard AS4031: 1992 Non-reusable containers for the collection of sharp medical items used in health care areas.
 - Australian/ New Zealand Standard AS/NZS4261: 1994 Reusable containers for the collection of sharp items used in human and medical applications.
- Ensure sharps containers being used are large enough to accommodate the types of devices being used in the area.

- In the event of a safety device failure i.e. non-activation of safety feature:
 1. Report through normal facility product complaint process
 2. The product complaint should be investigated at the local level to determine if due to:
 - Product failure/quality assurance problem
 - User technique requiring in-service/remedial training.
 3. Product complaints should be documented to ensure potential Statewide problems are identified.
 4. Trends in product complaint should be reported to (i) the company for quality assurance and analysis of failed product for manufacturing/design faults, and (ii) Health Services Purchasing and Logistics (HSPL) using the Procedure/Protocol for Complaints/Feedback which is available at http://www.health.qld.gov.au/hspl/tenders_contracts/complaints_pro.pdf
 5. CHRISP will follow up product complaint data for 12 months post-implementation.

Attachment 1

INDUSTRY CONTACTS FOR TRAINING

Retractable Syringes:

VanishPoint Syringes – distributed by Scientific Educational Supplies (SES)

Ph: 1800 656 434

<http://www.ses.com.au> (Internet Access Required)

Needle-Free Intravenous Access Systems:

Alaris – Cardinal Health

Ph: 1800 110 551

<http://www.cardinalhealth.com.au> (Internet Access Required)

Becton Dickinson (BD) and Baxter

Ph: 1800 656 100

<http://www.bd.com/anz/> (Internet Access Required)

Winged Infusion and Blood Collection Sets:

Becton Dickinson (BD) and Baxter

Ph: 1800 656 100

<http://www.bd.com/anz/> (Internet Access Required)

Terumo Corporation

Ph: 1800 837 866

<http://www.terumomedical.com/> (Internet Access Required)

Blood Collection:

Becton Dickinson (BD)

Ph: 1800 656 100

<http://www.bd.com/anz/> (Internet Access Required)

VanishPoint blood collection tube holder – distributed by Scientific Educational Supplies (SES)

Ph: 1800 656 434

<http://www.ses.com.au> (Internet Access Required)

Safety Peripheral Intravenous Catheter:

Becton Dickinson (BD) and Baxter

Ph: 1800 656 100

<http://www.bd.com/anz/> (Internet Access Required)

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