

FAQ for NHS Wales

NEURAXIAL (ISO 80369-6/NRFit)

CONNECTORS CHANGEOVER

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Frequently Asked Questions

1. What is a small-bore connector?

- A small-bore connector is a connector with an inner diameter of less than 8.5mm used to connect medical devices, components and accessories for the purposes of delivering fluids or gases.

2. What changes are coming to small-bore connectors?

- The International Organisation for Standardisation (ISO¹) has developed a suite of standards for small-bore connectors, known as ISO 80369 series. These standards provide design and performance specifications for a range of connectors which can be used for different medical device applications (see table below) and which have been shown to reduce the risks of cross-connections between applications.

80369 part	Use/Application	Common Name
-2	breathing systems and driving gases	
-3	enteral applications	ENFit
-5	limb cuff inflation	
-6	neuraxial applications and major regional anaesthesia	NRFit
-7	intravascular or hypodermic applications	Luer

¹ ISO (International Organization for Standardization) is the world's largest developer of voluntary International Standards. It has published more than 19,500 International Standards covering almost all aspects of technology and business and has members from 163 countries.

3. When will the changeover take place ?

- The NHS England Small Bore Connectors Clinical Advisory Group worked with the Devolved Administrations, including the Welsh Non-Luer Connectors Reference Group (WNCRG) and Scottish and Northern Ireland representatives on a coordinated date for UK NHS introduction of the new devices, which was due to take place in April 2017. However industry took longer than expected to develop the devices incorporating the NRFit connector, and therefore the introduction was delayed.
- The WNCRG (Welsh Non-Luer Reference Connectors Group) has been meeting throughout 2021 to assess whether sufficient NRFit equipment is available for a deployment to take place. The WNCRG has now asked Welsh NHS organisations to reconvene their local groups to consider deployment of NRFit during 2021/2022.

4. Will non-Luer new medical connectors have distinct names?

- Connector naming is not included in the ISO 80369 series of standards. Therefore, companies are free to name the new connectors as they choose.
- An industry organisation known as GEDSA and members of the ISO joint working group have proposed the use of the name “NRFit” (pronounced ‘ner-fit’) for the new connectors used for neuraxial and major regional applications. NRFit is a name that will be used to identify devices that comply with the ISO 80369-6 standard.

5. Why is industry adopting the new ISO neuraxial connector?

- The standard small-bore connector in the medical device field for many years has been the Luer connector. Because the Luer connector was such an effective and reliable design, it has been used in many different types of device applications, such as vascular, enteral, respiratory, epidural, and intrathecal. The consequence of this has been that devices that were never intended to be connected together can, in some circumstances, allow the fatal wrong route administration of fluids and gases such as the delivery of toxic chemotherapy drugs into the spinal canal.
- The NPSA (National Patient Safety Agency - now dissolved) published a series of alerts in 2009 and 2011 requiring the UK NHS to use non-Luer devices for neuraxial bolus doses and infusions. This was partly successful with many English Trusts adopting proprietary systems for chemotherapy use in particular. Other Trusts and the Devolved Administrations of Wales, N Ireland and Scotland decided to wait for the ISO standard to be published.
- As well as preventing the delivery of IV drugs into the neuraxial space, use of the ISO 80369-6 connectors will also prevent wrong-route delivery of neuraxial medicines (such as bupivacaine) intravenously.

6. What are the implications of these new standards?

- Unique connector designs promote better patient safety and helps ensure that connectors for unrelated applications are incompatible. This reduces the chances of wrong route injections and infusions and the harm and death associated with these incidents.
- Syringes used for intravascular and hypodermic access will no longer be interchangeable with neuraxial syringes. For manufacturers and suppliers this may cause temporary inconvenience as procedure packs may be more difficult to customize. Clinicians need to be aware of what extra items they use which will in future need to be 80369-6 compliant, as those will need to be ordered specifically (for example three-way taps, epidural filter caps and manometers etc) : as pulling those from intravenous supplies stock will no longer suffice.
- Pharmacy departments preparing medicines for intrathecal and epidural use (for example, aseptic preparation of intrathecal chemotherapy preparations) will also have to ensure they have appropriate stocks of syringes, syringe caps, filling devices, filters and other equipment necessary to fill and dispense using the new connectors.

7. What connectors are affected by the ISO 80369-6 (NRFit) connector standard?

- 80369-6 applications involve the use of medical devices to administer medications to and take samples from neuraxial sites (central nervous system including intracranial and spinal canal such as epidural and intrathecal), major peripheral nerve local anaesthetic blockade and continuous wound infiltration. This includes anaesthetic delivery, monitoring cerebro-spinal fluid (CSF) pressure, and removing CSF for therapeutic or diagnostic purposes.
- It should be noted that there are risks from delivering neuraxial medications intravenously, such as bupivacaine, and whilst the ISO connector will address the near-patient misconnection risk of attaching a neuraxial giving set to an IV cannulae, there is still the risk of misconnecting the reservoir (i.e., the infusion bag) to an IV line as presently they all use the same spike connector. ISO have also therefore developed a series of standards (*ISO 18250 - Medical devices — Connectors for reservoir delivery systems for healthcare applications*) which includes specifications for connectors to be used with, for example, epidural infusions (ISO 18250-6:2019 - Part 6: Neural applications).

8. Who developed the new ISO 80369-6 connector design?

- This new connector design was developed by ISO through the combined global effort of clinicians, regulators, test houses and industry. The initial design came from a UK anaesthetist, Dr Philip Bickford-Smith.
- The ISO 80369-6 connector has undergone a rigorous validation process including computer aided design (CAD) misconnection tests, laboratory leak testing and human factors and usability assessment.

9. Why should we adopt the new 80369-6 connector?

- The ISO 80369-6 connector provides a simple way to reduce the risk of neuraxial misconnections which in turn should improve patient safety.
- The new connector reduces the chance of an unintentional cross-connection with any other connector intended for non-neuraxial routes.
- In some countries, the legal systems expect clinical staff to take all reasonable steps to mitigate the risk of cross-connection incidents, and therefore may expect clinical staff to use devices that use these application specific connectors.
- Non-adoption of the new connectors may expose clinical staff and organisations to legal challenges if further wrong-route incidents take place which could have been prevented by use of ISO 80369-6 compliant devices.
- Because industry is adopting the new standard, it is expected that at some time in the near future, Luer versions of neuraxial devices such as spinal needles will no longer be available.
- Note that wrong-route injections and infusions continue to take place in the UK NHS.

10. What makes the new ISO 80369-6 connector different from the current Luer system?

- The new ISO 80369-6 connector looks like a Luer connector, but is about 20% smaller and has a unique design that reduces the risk of cross connection with other connectors developed under the same series of standards, especially with Luer connectors. There is one visible difference: slip males will have a collar surrounding the connector, as currently only seen in Luer locking versions.

11. When will the new ISO 80369-6 connector be available?

- Devices with the ISO 80369-6 connector have been available for a number of years in the UK market, in particular NRFit syringes and spinal needles. However not all manufacturers supplying NHS Wales have made the transition to NRFit, although it is expected that most of the remaining key products will be available with NRFit connectors during 2021.

12. How will the new ISO 80369-6 connector be introduced into my healthcare organisation?

- In Wales, the introduction is being coordinated by the WNCRG (Welsh Non-Luer Connectors Reference Group) in conjunction with NWSSP procurement and local Health Board representatives.
- The principle being followed in Wales is that clinicians continue to use the same brand and design devices currently in use, where the only difference is that they will have the new ISO 80369-6 connector attached. The aim of this strategy was to minimise disruption during the changeover.
- We are planning to wait until all of the essential equipment is available before beginning the implementation.
- Healthcare facilities and providers will also be able to call upon industry to help them with a careful transition plan to replace Luer devices with the new ISO 80369-6 connector.

13. Will there be new Catalogue numbers for the new 80369-6 devices ?

In Wales we are encouraging manufacturers to use significantly different catalogue numbers for Luer and non-Luer devices to help differentiate them in the supply chain and in the clinic.

14. Are there any risk register templates available ?

- Yes. Welsh NHS staff can access them from the [neuraxial web page](#)

15. Who do I contact for further information ?

- You can contact the chair of the WNCRG, Pete Phillips <pete@smtl.co.uk>

16. How do we order NRFit products?

- Currently these products are required to be ordered via a non-catalogue request. Agreement schedules can be cascaded to nominated personnel who can place orders via this route

17. Can these items be loaded into Omnicell?

- Items can be loaded into the Omnicell cabinets but must go through the non-catalogue route when being set up.

18. Can we restrict the catalogue to enable NRFit products to be loaded into the catalogue for ease of ordering?

- Currently we are unable to restrict the catalogue to department or requisitioner's. Once the roll out of all NRFit products are deployed within Health Board, we can then look at implementing the products into Oracle.

19. If we use Neuraxial parts from another manufacturer's set, how will we know the products will work together?

- As long as the connectors have been produced in compliance with the ISO standard, then it is expected that the devices will connect together effectively and safely.
- All major neuraxial device manufacturers are expected to comply with the proposed new ISO standards to help ensure neuraxial components fit together as a system.
- Many compatible devices will be marked with the NRFit label or with the standard number (ISO 80369-6).
- For clinician convenience, some items, such as syringe plungers, are expected to maintain the yellow colour seen in most proprietary non-Luer syringes in current use.

20. Is it mandatory to transition to the new ISO 80369-6 connector?

- There is no legal requirement to make the transition. However, there is an expectation that all UK organisations providing NHS funded care will implement the new connectors, in line with the NPSA safety alert of 2011 (NPSA/2011/PSA001).
- Organisations which fail to change to non-Luer connectors may find themselves exposed legally if a wrong-route incident occurs and they have not used devices which may have prevented that incident.
- As the ISO 80369 series is stimulating a global change in connectors on neuraxial devices, it is expected that eventually all suppliers will have moved to the ISO 80369-6 connector, and Luer-compatible neuraxial devices will be rare.

21. When will the neuraxial devices with current connectors be discontinued?

- Discontinuation of items is at the sole discretion of manufacturers. For precise timing of item discontinuation, contact your supplier representative. The Luer connector for neuraxial devices will be phased out of hospitals on varying timelines.
- It is important to understand that some devices, such as spinal needles, are presently used for non-neuraxial applications, such as amniocentesis and joint injections (sometimes called 'off-label' use). The use of long needles with a Luer connector will still be required by these specialists (for example, orthopaedic surgeons) after the change to 80369-6 connectors, and some manufacturers have declared their intent to market such devices to meet clinical needs. You should therefore start contacting the suppliers of the needles you presently use and ask them what plans they have for long needles with Luer connectors in the future. There is a risk that clinicians undertaking some clinical procedures may find there is no suitable device available after the withdrawal of Luer-based spinal needles from the healthcare setting. If there is no alternative option a clinician may decide to use the ISO 80369-6 devices off-label i.e. for a purpose other than that what it was intended by the manufacturer. The [MHRA has published guidance on off label use of medical devices](#) including considerations and recommendations for clinicians. You should also ensure that you follow your local governance and risk management procedures, which may include documenting the usage in your local risk register or local governance system.
- Liaison with the specialist clinicians who use spinal needles 'off label' should also be undertaken to ensure that they understand the change and what options will be available to them post-change.

22. Will there be new Catalogue numbers for the new 80369-6 devices ?

- Introduction of new items and related issues such as new item numbers are at the sole discretion of manufacturers. For precise answers relative to new item introductions, contact your supplier representative.
- In the UK, clinical incidents have already arisen over confusion between proprietary neuraxial connector devices and standard Luer devices, resulting in delays to treatments. It is therefore anticipated that many manufacturers will use product codes

that allow individuals to distinguish easily between Luer, ISO 80369-6 devices to avoid such incidents.

23. If applicable, when will the new catalogue numbers be available and how will we know when to order the new devices ?

- Introduction of new items and related issues, such as new item numbers, are at the sole discretion of manufacturers. For precise answers relative to new item introductions, contact your supplier representative and NWSSP Procurement.

24. Will there be a price increase?

- Pricing is at the sole discretion of device manufacturers.
- Experience with manufacturers supplying proprietary non-Luer systems in the UK was that many kept their prices stable.

25. Will there be a standard colour for the 80369-6 connector?

- Colour-coding is not included in the ISO 80369 series of standards. The standards will only address the shape and size of the new connectors. These engineering controls make it unlikely that two unintended connectors will fit together. While you might see a consistent colour used for devices with neuraxial connectors, it is not a requirement. There is, however, a trend in parts of the world to use the colour yellow to indicate neuraxial routes. This feature would be provided for convenience, not safety.
- Where colour differentiation is used on syringes, it should be on the syringe plunger, not on the syringe barrel where it could interfere with the ability to inspect the syringe contents.

26. Does this new system require that devices using the Luer connector become obsolete?

- The Luer connector will still be used for intravascular and hypodermic access and now has its own standard in the ISO 80369 series – ISO 80369-7 (this was previously a separate ISO standard, ISO 594).
- It is, however, expected that availability of *neuraxial devices* using Luer connectors will decline rapidly because of the significant patient safety benefits associated with a connector which will not cross-connect with Luer. One of the most effective ways to comprehensively reduce the risk of misconnections and enhance patient safety is to ensure that connectors of different delivery systems (i.e., neuraxial and intravascular) are not compatible.

27. Will there be adapters for different kinds of syringes?

- There will be no adapters. Syringes will be supplied with the application specific connector.

28. Is there any specific action required for pharmacy departments ?

- Yes. Pharmacy departments undertaking pre-filling of syringes for neuraxial/intrathecal use (such as those for spinal chemotherapy, antibiotics and pain management) will be using new ISO-compliant neuraxial-specific syringes, and should instigate a formal, documented change control process which covers changes to policy, worksheets (which will in future need to be specific regarding the connector on the syringe), training, and awareness . This must be managed locally as part of a multidisciplinary approach.
- Due to the potential change in handling and connecting the new devices, it is recommended that pharmacy departments undertake broth fills as part of the initial validation run for ISO 80369-6 compliant devices.
- Pharmacy departments should also ensure that they have appropriate evidence to support any storage requirements they have for the new syringes. This could be produced by industry or by the departments themselves.
- The Pharmacy Aseptic Services Group ([PASG](#)) have coordinated the production of a protocol for stability and storage validation studies. This is available on the [PASG website](#), and includes advice notes for products already assessed against the PASG protocol. At present this includes B. Braun and GBUK.
- Pharmacy departments using bulk-sterilised syringes (from companies such as Helapet, MicronClean, AMD and Ecolab) should ensure their supplier has a plan of action to make the ISO 80369-6 syringes and ancillary equipment available prior to implementation or ensure that they can make alternate arrangements.

29. Are Tamper Evident Caps available for chemotherapy ?

- In Wales many Aseptic Pharmacy departments routinely use Tamper Evident Caps (TECs) to cap syringes containing chemotherapy drugs intended for intrathecal administration. The syringe is then usually sealed in a plastic overwrap. The TEC currently serves a dual purpose of sealing the syringe to ensure the drug remains sterile as well as providing clinical staff with the assurance that the syringe and contents have not been tampered with.
- At present most of the potential suppliers of non-luer neuraxial syringes do not have TECs available, and are unlikely to do so in the near future. Agreement has been reached between aseptic pharmacists in Wales on an alternative solution to TECs for intrathecal chemotherapy presented in NRFit neuraxial syringes.
- Non-luer neuraxial syringes containing intrathecal chemotherapy will be sealed in a plastic overwrap.
- The overwrapped syringe will then be placed in a purpose designed tamper evident intrathecal chemotherapy bag.

30. Will elastomeric and cassette delivery devices for analgesia be affected ?

- Yes. Elastomeric devices and cassettes for epidural/regional use will need to have an ISO 80369-6 (NRFit) connector on the line that connects to the patient.

- **Elastomeric devices:** Eventually the filling port on elastomeric devices for epidural/regional use should also be ISO-compliant.
- **Cassettes:** Because cassettes are filled through the administration line there is no separate requirement for a filling port on these devices. Small scale filling of these cassettes for epidural/regional use could be carried out using NRFit syringes. However, for larger scale batch production this may present an issue for aseptic units (NHS or commercial) using automated filling pumps until the filling lines used in these pumps become available with an ISO compatible connector for connection to the cassettes.
- We advise NHS and commercial aseptic compounding units, using automated filling pumps to fill these devices for epidural/regional use, to raise this issue with their pump manufacturer. Whilst initially this will only be a problem for cassette filling, in the longer term it will also apply to elastomeric devices for epidural/regional use when the manufacturers of these devices change the filling ports from luer to NRFit connectors.

31. Are there any specific actions for EBME/Medical Physics departments ?

- Yes. If your hospital uses syringe drivers for intrathecal or epidural infusions, you will probably have to set the driver up for one of the new designs of neuraxial syringes.

32. What about specialist areas of anaesthesia such as Caudal injections ?

- At present anaesthetists in the UK use IV devices to undertake Caudal injections (such as a non-ported IV cannula or hypodermic needle). In future, accessing the neuraxial/epidural space with these Luer devices may be classified as 'off-label'. The solution is to use a specific caudal device utilising the ISO 80369-6 connector when these are available.

33. What about highly specialist areas such as implantable pain management systems ?

- Implantable reservoirs and vascular access ports usually use special non-coring needles, commonly known as Huber point needles . They are used to penetrate the skin and the septum of a reservoir or access port underneath the skin. If these ports are connected to the neuraxial system, then theoretically the Huber needle should use a 80369-6 hub. As a result of their highly specialised nature, the production of such devices is at the discretion and control of the manufacturers. It is unclear whether industry will have these available in the near future, and therefore plans should be made to manage these devices through the risk register initially.

34. How will training be provided ?

- Training is expected to be coordinated by the local hospital groups in conjunction with Procurement.

- When planning the training programme for the deployment of ISO 80369-6, we recommend that you train your acute pain management teams first, as in many hospitals it is this group who train ward staff.

35. Do we need a Plan B in case we encounter problems with the new ISO compliant devices ?

- A phased rollout within an organisation would mean that Luer or proprietary non-Luer devices were still available in the organisation if necessary, especially in the early stages when it is more likely that issues would be encountered. It may be prudent to keep a supply for the first few weeks. The expectation is that the risk with ISO should be lower than with the previous proprietary connectors as it is a single design. Issues should be reported on a case by case basis and risk assessments made to decide on continuing use of the ISO system where required.

36. Is there any documentation which would help my organisation deploy these new devices ?

- Yes. A [HOWTO document](#) has been authored by two clinicians involved with the deployment of Surety devices in NHS organisations in England.

37. Are External Ventricular Drains (EVDs) covered ?

- Yes. The clear intent in the UK from the original NPSA alert was that EVDs would be covered. The [February 2011 Newsletter \(Page 4\)](#) clarifies this.
- In addition the Scope of ISO 80369-6 states:
 - *NOTE 1 Sites for the neuraxial application include the spine, intrathecal or subarachnoid space, **ventricles of the brain**, and the epi-, extra-, or peri-dural space. Neuraxial application anaesthetics can be administered regionally affecting a large part of the body, such as a limb, and include plexus blocks, such as the branchial plexus blocks or single nerve blocks. Neuraxial application procedures include continuous infusion of wounds with local anaesthetic agents.*
- If the products required by clinicians are not available then Trusts, Health Boards and other providers of NHS funded care should initially manage through their risk register. Industry have signaled their intent to make ISO compliant EVDs available and some manufacturers already have NRFit compliant products in the marketplace.

38. Should spinal needle introducers use the new connector ?

- In the UK the consensus has been that a non-Luer connector (in this case, an ISO 80369-6 connector) on the introducer both prevents the wrong route injection of IV drugs (which would be possible with a Luer connector) and allows the clinician, in rare circumstances when they may accidentally pierce the dura with the introducer, to deliver spinal medication if necessary.

- The alternate view is that it should have no connector (for example, a Sise introducer).
- Luer 80369-7 connectors should not continue to be used on introducer needles once ISO 80369-6 has been deployed, because it introduces the risk of giving IV medications spinally if the introducer pierces the dura.

RESOURCES

1. A [video is available](#) which can be used in training sessions to help increase awareness of the changeover.
2. A [HOWTO](#) document with advice on managing a controlled changeover on a hospital by hospital basis.
3. The [Jan 2017 Anaesthesia News](#) has an article on NRFit

This FAQ is based on an original FAQ coordinated by Rory Jaffe at CHPSO (California Hospital Patient Safety Organization) and GEDSA (Global Enteral Device Supplier Association) including contributions from a number of UK experts. The panel who have edited it for the UK includes Pete Phillips (Chair of the Welsh Non-Luer Connectors Reference Group), Paul Sharpe (Chair of the NHS Improvement Neuraxial Oversight Group), and Matthew Alderman (Operations Manager SMTL and member of the WNCRG). It was updated in August 2021 for the Welsh NHS.