







## Drug misuse and dependence

UK guidelines on clinical management

# HOSPITAL SECTION ONLY

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This extract from the 2017 Clinical Guidelines was produced for hospital staff in June 2019.

The full guidelines are available at www.gov.uk/government/publications/drug-misuseand-dependence-uk-guidelines-on-clinical-management

They include more detailed information on:

- essential elements of treatment provision
- psychosocial components of treatment
- pharmacological interventions
- health considerations
- other treatment situations and populations

### 7.5 Hospitalisation

#### 7.5.1 Key points

- For those dependent on opioids and in need of opioid substitution treatment (OST), provide reassurance, rapid assessment and suitable prescribing as soon as possible after admission, to facilitate their medical treatment as well as to manage the dependence.
- Hospital staff responsible for the assessment of an opioid-dependent patient should contact their local liaison or drug treatment service for advice and support as appropriate.
- Appropriate communication between key professionals in hospital and in the community, particularly around time of entry to hospital and around discharge, is vital to ensure safe,

effective and seamless care, including making appropriate plans for seamlessly and safely continuing OST prescribing in the community.

 Commissioners and planners of services can enhance safer and more effective care locally by developing the links between hospital services and local drug treatment services.

#### 7.5.2 Overview

People who use drugs and alcohol may attend emergency departments or be admitted to general or mental health hospitals for treatment of conditions either directly related to, or coincidental to, their substance use. In this population, medical conditions may be masked, neglected or hidden for a number of complex reasons.

Patients may also present with the toxic effects of, or in withdrawal from, a range of drugs and alcohol they have used. They may have been using one or some combination of traditional or new psychoactive substances, which may be stimulants, depressants (such as benzodiazepines), psychedelic drugs with hallucinogenic effects and/or synthetic cannabinoid receptor agonists. Some such individuals, including new psychoactive substance users, will also present with injecting related problems, including from use of drugs like mephedrone or methamphetamine (see <u>section 7.7</u>).

Many 'traditional' drug dependent patients will present with problems associated with their heroin, crack or cocaine use, and with problems associated with injecting their drugs. Such patients now make up part of an ageing, high-risk, population who present at hospitals with an often complex picture of ill health related to current or historic substance use and with problems related to their ageing and to comorbid physical and mental conditions. Many also suffer from the effects of marginalisation, homelessness and poverty that may be inextricably linked to and heightened by their drug and alcohol use. Many homeless patients who use drugs continue to suffer from being discharged straight back onto the streets after brief hospital admissions, often without their underlying health complaints being fully addressed – which only decreases chances of successful recovery and increases the likelihood of readmission (Homeless Link 2014).

Admission to a hospital setting, whether planned or unplanned, provides an important opportunity for health professionals to detect and to address conditions previously undiagnosed, unresolved or neglected, including psychiatric disorders. People who inject drugs who seek care in an emergency department for soft tissue infections are at high risk for subsequent hospitalisation, amputations and death, so this presents a key opportunity for effective prevention of future harm and re-presentations (Binswanger et al 2008 and Takahashi et al 2003).

Common reasons for hospital visits related to drug use are:

- poisoning by illicit drugs and toxic states
- bacterial infections and abscesses
- bone, joint, respiratory and bloodstream infections
- thromboembolic disorders

- skin ulceration (including injecting related sores and open wounds)
- fevers
- problems with heart, lungs and liver
- injuries caused by being attacked or falling over (particularly among the homeless).

Unconscious bias or stereotyping of individuals who use drugs can inadvertently prejudice their assessment and management, not least when such patients may also present with complex problems. This has been found to affect their treatment outcomes, so it is important that all hospital clinicians, particularly those with limited familiarity caring for individuals with problems with substance use or dependence, do remain vigilant to the potential influence of such factors for their own such hospitalised patients.

Patients may withhold information for fear of being stigmatised, judged or inviting unwanted interference from outside services, such as the police or social services. Confidentiality issues should be addressed sensitively and clearly.

People who use drugs have the same entitlement as other patients to the services provided by the NHS, including access to adequate symptomatic and pain relief, and to proper discharge planning. It is the responsibility of all doctors and other clinicians to provide the appropriate care for both general health needs and for relevant drug related health problems, whether or not the patient is ready to stop using drugs.

Wherever possible, all hospitals should maintain contacts with local drug and alcohol services, as well as with emergency homeless shelters and support organisations, preferably through hospital-focused staff trained in substance misuse issues.

#### 7.5.3 Admission

Admission to hospital represents an opportunity for diagnosis, intervention, treatment and care for patients who may have complex, unrecognised or untreated health problems.

An initial objective in hospital for a person who is found to have problems with drug use is often to rapidly stabilise any acute drug effects (or any current or potential acute withdrawals) so that the patient can be adequately assessed and investigated, and offered appropriate treatment for any non-drug-related presenting medical conditions (and for any further drug-related treatment needed).

Planned admissions, with adequate communication, provide a better opportunity for preparation for the admission and for any subsequent transfer of care on discharge. Emergency admissions and emergency department treatment present greater challenges. However, well thought-out protocols and guidance for how hospital staff can respond to people who may have problems from their use of drugs or alcohol, which address the full pathway from before admission to the point of discharge, will support better outcomes for the patient and clinicians, and can reduce the likelihood of re-presentation.

Effective care can be improved with suitable organisational planning by having:

 identified hospital medical and other clinical staff who are trained in the assessment and treatment needs of people who use drugs and who interface with local substance misuse treatment services

- identified support available from specialist hospital staff, such as senior nurses in the pain team, staff from HCV and HIV services, psychiatric unit staff or phlebotomists for difficult venous access
- a multidisciplinary approach to care that extends throughout a person's admission, treatment and discharge, and crucially when relevant, involving liaison with community services to ensure seamless care planning.

It is worth considering that, as more hospital, drug and mental health services engage trained volunteers and service users in the roles of peer support, advocacy and mentoring, such individuals can be a useful resource and support for the person entering or remaining in hospital, and when being discharged into the care of community substance misuse and mental health services.

#### 7.5.4 Opioid-dependent patients

#### 7.5.4.1 Assessment of opioid-dependent patients

The admitting clinician must ensure that an adequate assessment has been made before prescribing substitute opioids or other controlled drugs.

A full comprehensive assessment of dependence on heroin or other opioids requires specialist addiction knowledge and expertise. While hospitalisation can offer an excellent opportunity to engage a patient in starting specialist treatment of dependence, hospital doctors are strongly encouraged only to initiate OST as part of, or with clear advice and support from, a specialist drug treatment team (either through any liaison service available or by contacting the relevant community drug service). Appropriate senior advice should be sought. Hospitals should ensure they have the contact details of their local specialist drug services and of any local drug liaison team who may be able to provide advice. Areas have differing commissioning and service provider arrangements, so different levels of support may be available (and may be quite limited in some areas).

However, it is still vital for the hospital doctor to be able to treat opioid withdrawal states for all patients:

- Those confirmed as already in receipt of OST can be promptly and carefully initiated back onto OST, taking account of opioid tolerance confirmed to be present.
- Those not already on OST can have any acute opioid withdrawals treated in a timely fashion, consistent with safe prescribing. There should be attempts to seek specialist advice so that plans for further assessment or later transfer for ongoing drug treatment can be discussed.

Detailed guidance on assessment of drug dependence and on the use of opioid substitution treatment is provided in chapters 2 and 4. However, the following points provide a summary of the main considerations for the hospital setting. Aims of assessment by the hospital clinician(s) should include):

• obtaining all the information needed for diagnosis and treatment of the general health problem, whether an emergency or an elective admission

- obtaining information relevant to diagnosis and management of patients misusing or dependent on drugs, particularly heroin and other opiates, and any consequent health problems:
  - confirming that the patient is taking opioid and any other drugs and alcohol (history, examination, urine/drug analysis, discussion with opioid prescriber and dispensing pharmacist)
  - assessing the degree of dependence for which confirming a history of opioid withdrawals (particularly by observing objective signs carefully and sympathetically to minimise any distress) can be very helpful to support a firm diagnosis – see table 2
  - determining the need for any opioid prescribing, whether for acute management of withdrawals or as ongoing opioid substitution treatment for dependence
  - identifying information regarding complications of drug use and of any current or previous injecting – including localised infections, abscesses, DVTs or damage to peripheral circulation or heart valves, as well as HIV, hepatitis B infection and vaccination, and hepatitis C status
  - identifying, especially for homeless people and those at potentially greater risk, any general nutrition problems, and hepatitis A vaccination and TB status
  - considering other comorbid conditions common in those with drug dependence such as damage from alcohol and from smoking (typically looking for respiratory, cardiovascular and liver problems), and comorbid mental health problems
  - identifying any venous access problems, and potential urgent need for specialist phlebotomist support and/or use of equipment such as ultrasound imaging
  - identifying any dependent children and children who may be at risk, either from the impact of the drug dependence or from any prescribed opioids.

#### 7.5.4.2 Confirming the current community opioid prescribing

Information concerning the prescription is needed as a matter of high priority for any patient currently engaged in community OST. For patients currently being prescribed methadone or buprenorphine for treatment of opiate dependence, good communication between hospital and community is essential for safe patient care. Patients will usually have a named keyworker and a named pharmacy. They will be receiving treatment from either their GP or specialist drug treatment services. Prescribing in these cases should be a relatively straightforward matter of continuing the usual dose while in hospital but only where it has been confirmed the patient has been taking it.

The hospital doctor should ascertain, by independent means, the likely dose of methadone or buprenorphine to which the patient is tolerant, by confirming:

- the daily dose prescribed
- when the last dose was dispensed
- whether recently the medication has been collected regularly
- the time the last dose was observed to be taken by supervised consumption.

Only when the medication has been confirmed to have been collected daily by supervised consumption, can you be completely assured of the patient's current tolerance. In such cases, one can prescribe the full daily dose in hospital, that has been provided in the community, as soon as it is next due.

Communicating with the community pharmacy is usually crucial to obtain assurance of the dose of medication to which the patient is currently tolerant. The pharmacist can also confirm the recent compliance of the patient with regularly picking up their prescribed instalments. In some cases, the drug service provides dispensing of the medication instead.

Communication with the patient's specialist prescriber, GP or the keyworker (or by consulting electronically the emergency care summary (ECS) in Scotland) can also assist in confirming what medication has been prescribed but the key information to identify is what has been dispensed and whether consumption has been supervised.

It is also important to liaise with the community prescribing service and with the dispensing service/pharmacy so that the community prescription can be cancelled as soon as a hospital prescription has been provided.

#### 7.5.4.3 Initial dosing schedule for opioid dependent patients admitted to hospital

The initial objective of the drug treatment of an opioid dependent patient admitted to hospital should be to stabilise their opioid dose as quickly and safely as possible to avoid unnecessary distress and to stabilise the patient enough that they can be treated for any other medical conditions.

Opiate dependent patients generally harbour enormous anxieties around unplanned opiate withdrawals. This must be taken into account, especially with any prolonged waiting times in an emergency department for example, or in the early stages of admission before OST has been administered, as it may provoke a patient to leave before receiving treatment. While simple opioid withdrawal symptoms are not generally life threatening, associated anxiety and distress may become very significant for some, and particularly those who may have comorbid mental and physical health problems. It is important that rapid assessment and safe prescribing of OST is undertaken at the earliest opportunity by an appropriately trained member of hospital staff.

Hospitals need to ensure their staff understand the needs of people who use drugs in the hospital context. This includes the need to ensure that patients who are physically dependent on opioids receive suitable doses of OST to relieve the distressing symptoms of opiate withdrawal, the adequate treatment of acute pain (including the appropriate use of opioids as for any other patient), and the need to work flexibly with patients with complex mental and physical comorbidities and social problems. Failure to do so may result in continued use of illicit opiates on ward environments or premature discharge from hospital, with increased risks, untreated conditions and later re-hospitalisations.

For patients not on OST, or where there is uncertainty about recent compliance, it is appropriate to exercise particular care in initiating opioid substitution treatment.

On occasions patients may wish to take the opportunity of a hospital admission to reduce or detoxify fully. While this may occasionally be useful, if unplanned and just in response to the admission, the patient is very likely to relapse on leaving hospital, which exposes the patient to a substantially increased risk of overdose. This should be explained to the patient to ensure they are able to give properly informed consent to their decision to detoxify in these circumstances.

#### Safety first:

- Only prescribe following an assessment, including where possible ascertaining independently when the last prescribed dose of OST was dispensed and, if possible, when it was consumed.
- Do not be pressured to initiate prescribing prematurely but do carefully consider how to manage the balance of risks if a patient is developing opioid withdrawals that make it difficult for them to engage in their required medical/surgical/obstetric treatment.
- Differentiate the multiple withdrawal syndromes that may develop in polydrug and alcohol misusers in order to prioritise treatment. Methadone may initially mask alcohol and benzodiazepine withdrawal symptoms.
- Exercise particular care in cases of respiratory disease, head injury and liver diseases.
- Be extremely careful when prescribing additional drugs such as sedatives. It may be necessary, in some cases, to contact the relevant pain control team for further advice on improving pain control (see <u>section 7.2</u>).

When it is concluded that it is appropriate to initiate opioid substitution in hospital to manage the risk of withdrawal, methadone may sometimes be preferred over buprenorphine, as the latter acts as a partial antagonist and may interfere with acute pain management. However, the choice of an appropriate substitute will depend on the circumstances of the individual case (especially, for example, if respiratory depression is a concern). Buprenorphine may be continued for a patient already prescribed it but the treatment may need to be altered if better pain management is needed (see <u>section 7.2</u>).

While induction should broadly follow the protocols described in chapter 4, the close supervision available in a hospital environment does allow for a modified protocol:

- Prescribe a small dose of methadone in divided doses (for example, four times a day) under conditions of supervised consumption and titrate against opiate withdrawal symptoms while monitoring for toxicity. Initial dose should be no more than 10mg four times a day.
- After initial induction (over three to four days) allow time for methadone levels to reach a steady state (and so minimise the risk of an excessive cumulative increase in blood levels in the early days of treatment), then reassess and give the medication as a supervised single daily dose.
- For individuals who have been clearly confirmed by their dispenser to be taking their daily dose regularly by supervised consumption, the prescribing service may well advise providing the full daily dose immediately, although initially this can still be provided in divided doses for added assurance.

- Signs of intoxication such as drowsiness, slurred speech or constricted pupils indicate a need to discontinue the drug or reduce dosage.
- The final total daily dose of OST needed for heroin dependence can range very widely between patients in the community, particularly for methadone. No final dose should normally be determined in advance. However, caution should be exercised about the risk of cumulative toxicity (especially mindful that discharge may occur quickly and unexpectedly), so progressive increases should be based on the observed degree of stabilisation and cessation of withdrawals, and on the avoidance of any intoxication.

Patients presenting out of hours in receipt of existing community OST may have been dispensed advanced supplies for weekends and bank holidays. This may be in their possession. Patients do not always disclose this information on admission. They may be concerned about inadequate substitution treatment being provided for them (and they may also have access to illicit opioids). Every effort should be made to reassure the patient that any withdrawal signs will be treated in hospital and that medication continuity will be maintained upon discharge. Attempts should be made to establish the whereabouts of patients' own supplies.

While evidence indicates that optimal doses for most people in the community lie between 60 and 120mg, some people will need more and some people will need less due to a range of individual factors such as size, gender, age, other health problems and metabolic clearance rates. Doses between 60mg and 120mg may exert clinical effects for 24 to 36 hours; low doses exert clinical effects for only a few hours.

Where there is evidence of acute opioid withdrawal but it is not possible to corroborate the patient's information about their prescribed opioid treatment (for example, outside of pharmacy hours or on bank holidays), the OST medications can be titrated up as recommended above, and subsequently the titration may be adjusted in light of findings from communication at the earliest opportunity with community services.

The hospital pharmacist can provide advice on important drug interactions for methadone and/or buprenorphine such as with rifampicin, antiretroviral therapies and with urine acidifiers and alkalisers. They will also advise on the co-prescribing of other sedative or depressant drugs with these medications. <u>Annexe A5</u> and the BNF provide a summary of all such interactions.

Several factors can alter methadone plasma levels, including gastric emptying, pregnancy, liver metabolism, and certain medications, all of which can increase the risk of overdose.

#### 7.5.5 Other considerations

#### 7.5.5.1 Ward management

If concerned about a patient's behaviour, assess whether small changes to their medication or treatment may resolve the problem, or if the close monitoring or suspension of certain visitors is warranted.

In addition, a risk assessment can be completed to determine the risks to patient, staff, public and the environment, following which the following could be considered:

• the ingestion of medication is observed

- freedom to wander the hospital is controlled
- visitors are limited
- regular urine samples are taken for analysis
- the patient's bed is placed close to the nursing station to facilitate observation.

(Peagram 2013)

#### 7.5.5.2 Sleeplessness

Sleeplessness can present a management problem. It is a feature of opioid withdrawal and, therefore, as the titration of methadone progresses there will be a limited need for night sedation. This minimises over-reliance on sedative medication, which is itself dependence-forming.

Night sedation should not be considered in the first 2-3 days of stabilisation. The use of benzodiazepines should be actively discouraged unless there is evidence of concurrent benzodiazepine dependence. However, should the insomnia persist in exceptional circumstances and if z-drugs are not suitable, nitrazepam 5-10mg may be given at the discretion of the medical team. At the first appropriate opportunity, the medication should be discontinued.

#### 7.5.5.3 Dealing with emergency overdose

In a hospital, suspected opioid overdose will be treated with standard resuscitation techniques and with the use of naloxone.

In dependent patients, it is worth being aware that using stepped doses of naloxone, as recommended (see <u>section 6.4.4</u>), titrated carefully against response, may limit the severity of rebound withdrawals that themselves can lead to a problem of marked agitation (and possible attempts to leave the hospital). The recommended approach may also avoid unnecessary cardiac stress (in a population of patients who are anyway at risk of premature cardiovascular disease).

In emergency departments and in other situations where the patient may leave the hospital suddenly because of the precipitated withdrawal that naloxone has created, attempts should be made to make clear to patients that they are at risk of re-emergence of life-threatening sedation when the naloxone wears off, typically in around 30-60 minutes. Engaging friends or family in this discussion is also important if the patient wishes to leave prematurely and the support from loved ones may go further towards reassuring the patient and preventing early discharge.

#### 7.5.5.4 New psychoactive substances

Recent years have seen an alarming increase in acute admissions to emergency departments of patients in a confused and/or collapsed condition, following the use of new psychoactive substances (formerly called 'legal highs'). The numbers of such substances are many and increasing, with a wide variety of effects and toxicities. Patients frequently do not know what they have taken, descriptions on wraps may not be relied upon, and the toxicity of such drugs is often not well known. Medical treatment should be supportive. Following recovery, patients

should be encouraged to consider attending specialist substance misuse services for further advice and evaluation.

Clinical guidance on the treatment of NPS is available in the UK's recent publication, NEPTUNE 2015. See <u>section 7.7</u> on NPS in these guidelines.

#### 7.5.5.5 Managing pain control in opioid dependent patients admitted to hospital

Deciding what drugs to administer in the hospital setting, and in what doses, requires clear, careful and sympathetic discussion with the opioid dependent patient, and may be assisted by obtaining advice of a specialist pain management team or an involved anaesthetist.

Pain management is described in detail in section 7.2.

#### 7.5.6 Discharge

#### 7.5.6.1 Drug misusers not previously in treatment

Attendance at an emergency department or admission into hospital can present a window of opportunity to put people who use drugs in touch with other services to assist in their recovery.

On discharge the following information should be given as a minimum:

- general health promotion advice
- contacts for further help (such as needle and syringe programmes, drug treatment services or self-help groups)
- advice on reducing the risk of blood-borne virus infection and its consequences, including support for hepatitis B vaccination (this information is available from local drug treatment services)
- advice on preventing overdose.

Wherever suitable programmes have been established, naloxone and training in overdose should be given to any patient using opiates, including OST, and where possible to family or carers.

#### 7.5.6.2 Patients prescribed substitute opioids prior to discharge

If the patient was admitted on an opioid prescription from the community, this should ordinarily be continued on discharge and prescribing responsibility transferred back to the local drug treatment service or GP.

Ongoing treatment with methadone and buprenorphine should ideally only have been initiated following liaison with the community drug team and a documented plan for discharge and for safe prescribing should therefore be in place.

It is always preferable, if possible, that an appointment is made for assessment/reassessment by the specialist services either while the patient is still in hospital or otherwise immediately on discharge.

At least 24 hours before discharge hospital staff should contact the local drug treatment service, or the patient's GP, regarding discharge date and agree how much methadone or

buprenorphine should be prescribed to the patient on discharge. This may be influenced by local treatment policies. Prior discussion with the previous community pharmacist, or any proposed new one, may facilitate determination of suitable options for safe dispensing.

On the day of discharge, confirm to the GP or drug treatment service:

- whether that day's dose has been administered at the hospital and, if so, how much
- the number of days' supply that the patient is taking home (minimising this usually to around one or two day's supply, depending on availability of an appointment/arrangement for further prescribing, as larger amounts increase the risk of overdose or being pressured to hand over or sell their supply)
- any other drugs that the patient is being prescribed.

If the patient's drug misuse is being treated by a GP and the GP cannot be contacted, contact the patient's community pharmacist who should be able to advise whether a community prescription is still current and to agree arrangements for continuation or to avoid double-scripting.

In some cases, if there has to be a brief delay before attendance at the first appointment at the local specialist drug treatment service, the GP may be willing to provide a brief bridging of a prescription for a few days (or a week or two).

Some patients are in hospital away from the area they need to attend for treatment and it may simply not be possible to arrange an immediate prescriber assessment from the local specialist service. In these cases, it is still always important to make suitable arrangements for safe prescribing and dispensing of the medication following initiation of this treatment in hospital.

For heroin dependent patients who may have been admitted for 24 hours or less, or just for a day or two (e.g. for immediate management of an acute abscess), the patient may have needed to be carefully titrated on to an opioid primarily to avoid/treat acute opioid withdrawal. But they may not be willing to engage in specialist treatment for their dependence (or it may just not have been possible to arrange this or any suitable alternative from local services before the patient leaves the hospital). This is a difficult situation when the focus needs to be on minimising risks. For a very brief admission, the patient can often be expected to have remained broadly tolerant to their previous opioid/heroin use, but should still be advised about ways to reduce harm and to reduce the risk of overdose when they are expected to return to illicit heroin or other opioid use following discharge (see section 6.3). There is no evidential or ethical basis to justify advising such patients to use the opportunity to detoxify themselves from all opioids after the discharge, tapering down any opioid medication given on discharge. This is important given the known high relapse rates and the known increased mortality risks from loss of tolerance with such relapse back to heroin. This may therefore require a realistic discussion with the patient about how they can best aim to reduce the harm from the anticipated return to illicit heroin or other opioid. For example, the patient could be advised to act cautiously, take small amounts to start, avoid injecting, use with others who could provide assistance, preferably have naloxone available, and avoid any other sedative use or alcohol. This remains an opportunity to provide information and advice about self-referring or being referred by the hospital to their local service.

Some high-risk patients will need assertive advocacy support for continuity of their supply of OST once it has been started in hospital, even in emergency, and they should not normally be discharged until this has been established. These patients include:

- a person who uses drugs presenting in opioid withdrawal in late pregnancy
- a patient with a serious concomitant physical or psychiatric illness where heroin/illicit opioid use is complicating the clinical problems.

Take care in prescribing take-home doses. Added care is needed with advice and arrangements for those with children at home. Generally, take-home doses should be avoided if an alternative arrangement is available although one or two days' supply may be necessary to ensure continuity of care, for example, at weekends. For longer periods, it is important to limit availability by ensuring daily or frequent pick-up (through instalment dispensing or by provision of multiple appropriately dated prescriptions for community supply). Liaison with the local pharmacist may assist in arrangements for suitable, safe dispensing.

#### 7.5.7 Difficult venous access

For many people who have regularly injected drugs, access to peripheral veins for promptly needed blood-work and cannula insertions, can prove technically challenging for the clinician and worrisome for the patient. Clinicians may find surface veins generally inaccessible and multiple insertion attempts by different operators exposes the patient to an increased risk of complications and discomfort, while important laboratory test results can be delayed (Gregg and Murthi et al 2009). Such experiences may also lead to patients defaulting from follow-up blood-testing.

Some patients will report previous experience of substantial distressing problems with venepuncture. Phlebotomists or other clinicians who are experienced in venepuncture with people who inject drugs should be considered at the outset for such cases. Clinicians should discuss their intentions with the patient in cases where this could be a problem, and elicit their views and previous experience of such attempts. A plan should be agreed before proceeding.

Ultrasound-guided peripheral intravenous (UGPIV) access can be used as a quick and helpful tool for this patient group (being more successful, requiring less time, reducing the number of needle punctures, and improving patient satisfaction). It is a useful tool for any hospital and should be included in any protocols on caring for this patient group.

Among the many indications for bedside ultrasound, ultrasound-guided venous catheter placement is also well described and increasingly used.

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