



JOINT REPORT

INCREASING ADHERENCE TO CAUTI GUIDELINES: RECOMMENDATIONS FROM EXISTING EVIDENCE



European
Association
of Urology
Nurses



ACKNOWLEDGEMENTS

This report expands upon a 2020 report¹ by the **Spanish Association of Urology** (AEU) and **Foundation for the Investigation of Urology** (FIU) that was also endorsed by the **Spanish Society of Intensive Medicine and Coronary Units** (SEMICYUC), the **Spanish Society of Emergency Medicine and Emergencies** (SEMES), the **Spanish Society of Preventive Medicine, Public Health and Hygiene** (SEMPSPH) and the **Spanish General Nursing Council** (CGE).

The report was produced in partnership with the European Association of Urology Nurses, represented by its Chair, Susanne Vahr Lauridsen, who endorsed its findings, and in association with the European Association of Urology, which named experts including Florian Wagenlehner, chair of the European Section of Infections in Urology (ESIU) of EAU and a member of the guidelines group urological infections, to review and contribute to the report.

For ease of reading, a large number of scientific references have been removed. Unless otherwise referenced, the sources for the scientific statements in this report are the same as for the Spanish report and are included in the Bibliography at the end of this report.

ENSH Members



With the endorsement of



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SCOPE OF WORK

The European Network for Safer Healthcare (ENSH) joined forces with the European Association of Urology Nurses (EAUN) to work on a policy campaign to prevent catheter-associated urinary tract infections (CAUTI) in Europe as a path to improving patient safety and preventing anti-microbial resistance (AMR) through:

- ★ Improvement of adherence to existing European guidelines to prevent CAUTI
- ★ Development of European indicators to support the European Centre for Disease Prevention and Control (ECDC) and/or national surveillance systems

This project is warranted in view of the importance and consequences of urinary tract infections in patients with urinary catheters. This is a potential complication for patients receiving healthcare services and has negative consequences in terms of morbidity, mortality and AMR. In addition, suffering from a urinary tract infection, as with many infections, leads to higher—and largely avoidable—healthcare costs for society. It is essential to improve guideline adherence by the healthcare staff to reduce the incidence of CAUTI, protect patients and make better use of healthcare budgets.

This report was reviewed and improved by the following experts convened by the European Network for Safer Healthcare:

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KEY TERMS AND ABBREVIATIONS

Healthcare-Associated Infections (HAI):

Those infections that appear in connection with receiving healthcare, including infections acquired during hospitalisation. Infections are considered to be associated with health care when they appear on or after the third day of admission, this being considered as day 1. The term HAI not only relates to infections acquired during hospitalisation but also includes those affecting patients who reside in the community and who meet one of the following criteria: they have received intravenous therapy or specialised wound treatment at home, are on haemodialysis, are receiving intravenous chemotherapy treatment or have been hospitalised in an acute care facility for two or more days in the last three months. Also included in this definition are those individuals who are institutionalised in care homes or long-stay centres.

Urinary tract infections (UTI):

The Infectious Diseases Society of America (IDSA) defines urinary tract infections as the presence of $\geq 10^5$ colony forming units (CFU) /ml of an isolated bacterial species in a urine culture from a patient with symptoms suggestive of UTI. Urinary infections may be classified as uncomplicated urinary infections which include cystitis. The existence of a febrile UTI, pyelonephritis, renal or perirenal abscess is considered to be a major infection. Other types of infection are infections of the male accessory glands such as orchitis or acute prostatitis, which, depending on the method of classification, can be considered to fall inside or outside of this group.

Catheter Associated Urinary Tract Infection (CAUTI):

Bacteruria or funguria with a count of more than 10^3 CFU/ml, with growth of at least one isolated bacterial species in a urine culture in a patient fitted with a catheter with symptoms suggestive of UTI. UTI symptoms are dysuria, pain with micturition, burning in the urethra or haematuria. Spinal cord injuries often have different symptoms such as increased spasms, referred pain (above the level of the lesion) and signs of autonomic dysreflexia.

Antimicrobial Resistance (AMR):

Antimicrobial Resistance occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines, making infections harder to treat and increasing the risk of disease spread, severe illness and death. As a result of drug resistance, antibiotics and other antimicrobial medicines become ineffective and infections become increasingly difficult or impossible to treat².

Asymptomatic bacteriuria (ASB):

The presence of $\geq 10^5$ CFU/ml of at least one isolated bacterial species in a urine culture in the absence of symptoms suggestive of UTI. This group of patients does not require treatment with antibiotics except prior to procedures that traumatise the urinary system or in pregnant patients. Asymptomatic bacteriuria is per definition not an infection, but the colonisation of the urinary tract. It is always present in patients with a catheter. Treatment of ASB is a huge problem and one of the reasons of misuse of antibiotics.

EXECUTIVE SUMMARY

The indwelling urethral catheter is an essential tool for many hospitalised patients. According to European studies, 15-25% of hospitalised patients and 5% of patients in elderly homes have a urinary catheter³. At the same time, studies estimate that 41-58% of catheters in place are probably unnecessary.

Unfortunately, urinary tract infections are also a leading cause of infections in hospitalised patients, accounting for 40% of all HAIs. The risk of CAUTI increases by 5% for each day with a catheter⁴. CAUTI has lower morbidity and mortality compared with the other infections⁵. However, because it is so common, its cumulative impact is large.

The societal costs of CAUTI can be significant: In the United Kingdom alone, CAUTI costs as much as €100 million every year (more than €2,000 per episode)⁶.

Various public authorities' groups of urology experts (including individuals involved in this report) have developed official guidelines to prevent CAUTI. Unfortunately, the evidence shows that the recommendations are not sufficiently followed within the European Union. This leads to the fact that the costs and negative consequences in term of patient health due to CAUTI are still very high.

As the European Network for Safer Healthcare believes that this situation could and should be improved, this report aims to:

- ★ Identify common barriers to adherence to existing best-practice guidelines;
- ★ Propose solutions for healthcare professionals in order to improve adherence to existing guidelines and reduce the huge negative impact of CAUTI-related patient suffering and cost within the EU

Improving adherence to the official guidelines will enhance patient safety in Europe and a reduction in CAUTI will leading to a reduction in the consumption of antibiotics, the costs associated with such consumption and the prevention of antibiotic resistance.

On the basis of the report, the European Network for Safer Healthcare will also work with the European Commission, European Parliament, the European Centre for Disease Prevention and Control and with individual EU Member State representatives to raise awareness of the societal cost of CAUTI, promote CAUTI surveillance and reporting systems at EU and Member State level and implement and monitor the recommendations and quality indicators included in this report. Because of its significant impact on European citizens, some of whom fall ill and receive medical attention in countries other than their own, the ECDC should introduce a pan-European surveillance system and indicators for CAUTI and be given the means to demand and enforce improved adherence to existing guidelines.

KEY RECOMMENDATIONS FOR HEALTHCARE OFFICIALS

This list summarises our key recommendations for healthcare professionals. Adherence to these recommendations would improve patient outcomes, reduce the spread of AMR and save public healthcare budgets millions of euros per year⁷.

PROPER USE OF THE URINARY CATHETER

- ★ Urethral catheters should be used only when indicated, with a closed-circuit system and a port for taking samples
- ★ Catheters should be removed when they are unnecessary and their indication should be assessed daily

PROPER INSERTION OF THE URINARY CATHETER

- ★ Hand hygiene should be performed immediately before and after catheter insertion or any manipulation of the urethral catheter
- ★ A sterile/aseptic insertion technique should be used

PROPER MAINTENANCE OF THE URINARY CATHETER

- ★ Always keep the collecting system closed (urethral catheter, drainage tube and collecting bag)
- ★ Keep the urine flow free, without obstacles in the circuit, and the collection bag below the level of the bladder
- ★ Maintain good catheter hygiene and use a catheter securement device
- ★ Use checklists/ care bundle to aid in urinary catheter maintenance

GUARANTEE THE QUALITY OF THE CARE

- ★ Health professionals must receive specific training on the insertion and maintenance of the urethral catheter
- ★ The urethral catheter insertion and maintenance protocols must be reviewed and updated periodically (every 3 years and/or when new evidence is published)
- ★ Healthcare professionals need to receive regular feedback. Unit coordinators will periodically inform staff about urinary infections rates

DO NOT

- ★ Do not use antiseptics and antibiotics in daily hygiene
- ★ Do not use prophylactic antimicrobials in the insertion, maintenance or withdrawal of the urethral catheter
- ★ Do not change the urethral catheter routinely and periodically
- ★ Do not carry out bladder washes
- ★ Do not take cultures if infection is not suspected, except for colonisation studies
- ★ Do not routinely use antimicrobial-impregnated probes
- ★ Do not use antimicrobial treatment in asymptomatic bacteriuria

INTRODUCTION

Description of the problem

Healthcare Associated Infections (HAIs) can affect patients in any type of setting where they receive care and can also appear after discharge.

HAIs, also referred to as "nosocomial" or "hospital" infections, are infections occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission. HAIs can affect patients in any type of setting where they receive care and can also appear after discharge.

Being fitted with a urinary catheter is a major risk factor in developing HAIs, as urinary tract infections are the leading cause of infections in hospitalised patients, accounting for 40% of all HAIs. Studies carried out in hospitals show that 15.5% of hospital patients in Europe are fitted with a urinary catheter during their stay.

Evaluated by service, the percentage of patients with urinary catheters in one review was 45-79% in Intensive Care Units (ICUs), 17% in Medical Services and 23% in Surgical Services. Furthermore, 63-75% of healthcare-related UTIs are associated with the presence of a urinary catheter, a percentage that rises to 95% in ICUs⁸.

Catheter use is not only causing infections but also mechanical trauma, pain and mobility impairment which may lead to increased length of stay and mortality⁹. A qualitative study found that patients felt that alternative methods of excretion were not discussed, and the majority felt that they had not received adequate information on the risks of having an indwelling urinary catheter¹⁰.

Catheter associated urinary tract infection in Urology

The definition of CAUTI according to the CDC is a UTI where an indwelling urinary catheter was in place for more than two calendar days on the date of event (day 1 being the day of placement of the device).

The indwelling urethral catheter is an essential tool for many hospitalised patients. It is placed for several reasons, including output monitoring of unstable patients, voiding management for patients with urethral obstruction, and perioperative use for selected surgical procedures. However, it may carry predictable and unavoidable risk of UTI, perturbing host defence mechanisms and providing easier access of uropathogens to the bladder.

According to European studies, 15-25% of hospitalised patients and 5% of patients in elderly homes have a urinary catheter. More studies estimate that 41-58% of catheters in place are probably unnecessary. The risk for CAUTIs increases by 5% for each day with a catheter. The annual costs for CAUTIs accounts for more than €100 million every year (more than €2,000 per episode) in the United Kingdom¹¹.

CAUTIs have lower morbidity and mortality compared with the other infections as well as a limited financial impact¹². However, because they are so common, their cumulative impact is large. In total, CAUTIs account for over 1 million cases in the US and Europe each year.

Official guidelines have been developed to prevent CAUTI. However, it has been proven that they are not sufficiently respected within the European Union. This leads to the fact that the costs and negative consequences in term of patient health due to CAUTI are still very high.

As this situation could be improved, the following new report aims to:

- ★ Identify common barriers to adherence to existing best-practice guidelines
- ★ Propose solutions in order to improve adherence to these guidelines and reduce the huge negative impact of CAUTI-related patient suffering and cost within the EU

Improving adherence to the official guidelines will enhance patient safety in Europe. Reducing CAUTIs will lead to a reduction in the consumption of antibiotics, the costs associated with such consumption and the prevention of antibiotic resistance.

EUROPEAN GUIDELINES TO PREVENT CAUTI

Official guidelines to prevent CAUTI have been adopted by the European Association of Urology (EAU) and by the European Association of Urology Nurses (EAUN) including¹³:

- ★ European and Asian guidelines on management and prevention of catheter-associated urinary tract infections (2016)
- ★ Evidence-based guidelines for best practice in urological healthcare. Catheterisation indwelling catheters in adults urethral and suprapubic (2012; the update of the EAUN guidelines on indwelling catheters are ready for release at next annual conference in September 2021)

The World Health Organisation has also published a CAUTI training module and student handbook in the context of a broader infection prevention and control training package¹⁴.

In the effort to classify the measure and simplify the research, the EU Joint Action on AMR and HAI defined a bundle of recommendations for CAUTI prevention including¹⁵:

- 1. Avoid unnecessary urinary catheters**
- 2. Closed collection system**
- 3. Catheters as small size as possible**
- 4. Insertion – aseptic technique**
- 5. Maintenance – aseptic technique and avoid unnecessary manipulation**
- 6. Review urinary catheter necessity daily and remove promptly if not indicated**

BARRIERS TO IMPROVING ADHERENCE TO THE EUROPEAN GUIDELINES

Most of the recommendations for preventing CAUTI should be implemented by nurses in acute treatment hospitals and nursing homes.

Adherence to these recommendations is critical to the success and achievement of their objective: to prevent CAUTI.

The most significant barriers to CAUTI prevention recommendations are described in the following points:

Lack of training/awareness of doctors and nursing staff

Numerous studies reveal a lack of training and continuous training regarding the correct insertion and maintenance of urinary catheters. Regular education and competent programs are a must for everyone involved in catheter care, and that includes healthcare workers and the patient's family. The World Health Organisation (WHO) has developed an Advanced Infection Prevention and Control Training¹⁶.

Nursing staff work overload and turnaround

Numerous studies suggest that there is a direct relationship between the nurse/patient ratio and the incidence of urinary tract infections.

This is the most significant barrier to correct adherence to the CAUTI prevention recommendations. Nursing staff work overload significantly limits adherence to recommendations in three critically important areas:

- ★ The appropriate insertion technique
- ★ Maintenance of the catheters
- ★ Reviewing urinary catheter necessity daily and removing them promptly if their use is no longer indicated

Adherence to the recommendations requires time, attention and monitoring by the nursing staff. Work overload and turnaround is a limiting factor in adherence to these recommendations.

Appropriate infrastructure

In order to improve adherence by the nursing staff to the recommendations, it is essential that the hospital provides the appropriate infrastructure. There are several areas where infrastructure plays an important role:

- a. The supplies required for the aseptic catheter insertion technique should be available and conveniently located. The structure and physical distribution of hospitals in many cases limits the availability and convenient location of supplies needed for the aseptic technique. Currently, in many countries, the nursing staff collect several items required for the aseptic technique from different locations. As consequence, nursing staff needs a longer time to collect multiple items from different locations. The main implications are:
 - i. In many cases the insertion of the urinary catheter is performed without all the components required for an aseptic technique
 - ii. Inefficiency of the nursing staff: time to collect multiple items from different locations and additional time to collect forgotten components
- b. Lack of closed collection systems availability. All guidelines advocated maintaining a closed, sterile drainage system for indwelling catheters. To that end, the most recent guidelines recommended the use of a preconnected catheter and drainage system with sealed junctions. These systems eliminate the risk of the "human factor" and ensure adherence to the recommendations. But the incremental price of these systems sometimes make them unavailable
- c. Lack of Hand sanitisers in the bedrooms to ensure proper hygiene before catheter insertion
- d. Small space and over-the-bed tables to set up a sterile field for proper aseptic catheter insertion technique. Important note: it can be challenging for a nurse to perform this procedure alone. When necessary, proceed with a 2-person procedure in order to assist in positioning the patient and maintaining an aseptic technique

Awareness of the catheter's existence

Perhaps the most important CAUTI prevention strategy after placement of the catheter is to maintain awareness of the catheter's existence, as some healthcare providers may be unaware the catheter is in place.

In one study the physicians and medical students responsible for patients admitted to the medical services at four university-affiliated hospitals were given a list of the patients on their service. For each patient, they were asked: "As of yesterday afternoon, did this patient have an indwelling urethral catheter?" Respondents' answers were compared with the results of examining the patient. Among 288 physicians and students on 56 medical teams, 256 (89%) completed the survey. Overall, providers were unaware of catheterisation for 88 (28%) of the 319 provider-patient observations¹⁷.

RECOMMENDATIONS FOR IMPROVEMENT OF ADHERENCE TO EUROPEAN GUIDELINES

Regular education/training/awareness

Literature has emphasised the importance of staff education to increase staff competency level such as in the prevention of infections within healthcare facilities. The current trend in the field of education involves simulation-based learning. Simulations are used in the different areas of health care as well as across all levels of education. The use of simulation as an innovative teaching strategy promotes student's critical thinking skills, learning, and confidence. Moreover, it helps them learn to make sound clinical decisions to improve patient outcomes¹⁸. The WHO has developed an Advanced Infection Prevention and Control Training¹⁹. Both health care professionals and users alike should receive education in relation to insertion maintenance and removal of urinary catheters.

Ongoing surveillance and analytics

Inappropriate urinary catheter use is an easy habit to start and a difficult one to break. Consequently, many studies have emphasised the importance of on-going electronic surveillance system and feedback as an intervention to reduce HAIs, such as CAUTI, and sustain prevention efforts²⁰.

Analytic applications to provide process metrics and bundles adherence (see below Bundles check lists) provide infection prevention specialists, clinical and operational directors, and quality improvements staff easy visualisation of various process metrics, supporting the monitoring of catheter days, insertion bundle compliance, and maintenance bundle compliance.

Using the analytics applications, healthcare providers can drill down to the facility, unit, service, or patient level when analysing performance. This data provides them the ability to review the effectiveness of quality improvement interventions and provide supporting feedback to nursing staff and providers as appropriate.

Bundles' check lists

Checklists are an effective tool for safeguarding against preventable medical errors and for improving compliance with best practices in a variety of settings. For example, a 2014 review by Simpson et al. found that the use of bundled interventions including a checklist was associated with lower rates of central-line-related bloodstream infections in critically adults. In another

intensive care study, Berenholtz et al. estimated that the use of a checklist prevented catheter-related bloodstream infections, 8 deaths, and \$1.95 million in additional costs per year. Checklists have also been shown to reduce UC utilisation and CAUTIs specifically. A study evaluating the effect of a UC indication checklist in an emergency department found that the introduction of the checklist coincided with a 75% reduction in the number of UCs placed over a 5-year period and a 22% decrease in inappropriate UC placement. In an adult critical care setting, another study investigating the effect of a checklist on the use of indwelling UCs demonstrated a significant reduction in the duration of catheterisation and occurrences of CAUTIs. A similar study demonstrated that implementation of a daily rounding checklist in an adult intensive care unit reduced UC utilisation by 15%²¹.

Regular internal audit programs

Several studies suggest the benefits of regular audits on patients with urinary catheters by Infection Prevention and Quality Management departments in reducing CAUTI rates. Some studies have applied just culture, providing immediate feedback and real time coaching to all staff. K-cards and dashboards are used to follow up²². One example of audit process for CAUTI prevention by The Clinical Excellence Commission from New South Wales Government²³.

Protocols to restrict catheter placement

Simply put, patients without urinary catheters do not develop CAUTI. Yet, multiple studies show that between 21% and 55.7% of urinary catheters are placed in patients who do not have an appropriate indication and, therefore, may not even need a catheter. An easy access to a bladder scanner is recommended in order to evaluate the volume of urine in the bladder and prevent the insertion of catheters. According to NICE's guideline on the management of urinary incontinence, if incomplete bladder voiding is suspected or there are symptoms of recurrent urinary tract infections, a post void residual volume of urine should be measured. If available, ultrasound bladder scanning should be used rather than catheterisation because this is more acceptable to people and has a lower incidence of adverse events.

Over the past decade, several studies have employed interventions to decrease unnecessary catheter placement. Although educational interventions are a common and important first step to decrease inappropriate catheter use, more effective and potentially more sustainable interventions go a step further by instituting restrictions on catheter placement.

Protocols that restrict catheter placement can serve as a constant reminder for providers about the appropriate use of catheters, can suggest alternatives to indwelling catheter use (such as condom catheters or intermittent straight catheterisation), but perhaps most importantly, can generate accountability for placement of each individual urinary catheter.

A fairly typical approach for developing a catheter restriction protocol is to begin with a basic list of appropriate catheter uses, such as the list provided in the Centers for Disease Control and Prevention's Healthcare Infection Control Practices Advisory Committee (HICPAC) guideline. This list can then be tailored to include other indications based on specialised patient populations. The technology required to implement catheter placement restrictions ranges from:

- a. Low-technology strategies, such as a hospital or unit policy on appropriate catheter placement (using a bladder scanner can help to evaluate catheter volumes pre-insertion)
- b. Pre-printed catheter orders with limited indications
- c. Higher-technology strategies, such as computerised orders for catheter placement

Catheter restriction protocols have been a common component of successful multimodal interventions to decrease catheter use and/or CAUTI rates, including hospital-wide interventions and interventions tailored for specific environments, such as the emergency department, inpatient units (including general medical surgical wards and ICU), and in the periprocedural setting. Urinary retention protocols are a type of catheter restriction protocols that often incorporate the use of a portable bladder ultrasound to verify retention prior to catheterisation and recommend use of intermittent catheterisation rather than indwelling catheters to manage a common and often temporary issue.

Urinary catheterisation kits/sets

One of the most important risk factors in the development of CAUTI is the incorrect technique used in the urinary catheterisation and the detachment of the elements that make up the catheter and make it necessary to change it immediately. Most urinary catheters are not inserted in critical care units, but in the emergency units and acute treatment hospital wards.

The barriers to comply with the recommendations for CAUTI prevention set out in the previous chapter make it necessary to employ a suitable infrastructure in European hospitals that minimises these barriers. The European Association of Urology Nurses (EAUN) considers the use of urinary catheterisation kits/sets (commercial or prepared in the hospital) as the reference method for all European hospitals, and they should include the components listed in Annex I.

The main objectives for the use of the kits/sets are to:

- ★ Prevent the uncontrolled variation in clinical practice
- ★ Promote compliance with the existing guidelines for best urinary catheterisation practice
- ★ Prevent CAUTI

The main benefits of using urinary catheterisation kits/sets are:

- ★ Standardisation of the process: adherence to urinary catheter insertion recommendations
- ★ The inclusion in the kit/set of pre-connected and sealed urinary catheter systems, the components of which are linked by seals, will ensure that the system remains closed at all times, eliminating the risk of the "human factor" and ensuring adherence to the recommendation
- ★ Nursing staff efficiency: more quality time for patient care
- ★ Reduction in CAUTI, reduction in the consumption of antibiotics and the costs associated with such consumption, and the prevention of antibiotic resistance

There are numerous studies on the reduction in the incidence of CAUTI when urinary catheter kits/sets are introduced in acute treatment hospitals. Most of these studies come from the United Kingdom, a pioneer in the use of urinary catheter kits/sets. The studies point to an average reduction of 80% in CAUTI when urinary catheterisation kits/sets are introduced. Below is a summary of the experience of two studies conducted in the UK and published in 2019:

A. Study at Sherwood Forest Hospital, British Journal of Nursing, 2019, Vol 28, No 1

A programme to standardise urinary catheterisation practice was launched in 2016 at Sherwood Forest Hospital in the UK with the aim of reducing CAUTI. This programme involved the hospital-wide use of a urinary catheterisation set. In the first year after the introduction of the urinary catheterisation set, the incidence of CAUTI fell from 13.3% to 2.1% (between July 2016 and June 2017), representing a reduction of 80%. Savings from the introduction of the set were estimated at £33,000 per annum.

B. Study at Nottingham University Hospital, British Journal of Nursing, 2019, Vol 27, No 1

Inspired by the innovations in urinary catheterisation implemented in the United States, in 2014 Nottingham University Hospital introduced the use of a urinary catheterisation set in its two acute treatment centres, together with a training programme. The result of this initiative was a reduction in CAUTI of 80% between 2014 and 2016. The estimated annual savings were around £160,000.

Reminder interventions

The most important CAUTI prevention strategy after placement of the catheter is to maintain awareness of the catheter's existence, as healthcare providers may be unaware the catheter is in place. Thus, a key step in prompting removal of unnecessary catheters is frequently (by day or by shift) reminding nurses and physicians that the catheter remains in place. Catheter reminder interventions include:

- ★ A daily checklist
- ★ Verbal/ written reminder
- ★ A sticker reminder on the patient's chart or catheter bag
- ★ An electronic reminder that a catheter is still in place

Reminder interventions can be generated by nurses, physicians or electronic order sets, and can be targeted to remind either nurses or physicians about the catheter. Some reminder interventions have employed nurses dedicated to detecting unnecessary catheters. Reminder interventions can also serve to remind clinicians of appropriate catheter indications. Unfortunately, reminder interventions can also be easy to ignore, and catheters may remain in place without action. So, stop order interventions may be useful²⁴.

Stop order interventions

The next type of intervention to prompt removal of unnecessary catheters which goes a step further, is a 'stop order' that requires action. Stop orders prompt the clinician (either nurse or physician) to remove the catheter by default after a certain time period has elapsed or condition has occurred, unless the catheter remains clinically appropriate.

For example, catheter stop orders can be configured to 'expire' in the same fashion as restraint or antibiotic orders, unless action is taken by a clinician. Stop orders directed at physicians require an order to be renewed or discontinued based on review at specific intervals, such as every 24–48 h after admission or post-procedure.

Stop orders directed at nurses either require the nurse to obtain a catheter removal order from physicians or can empower nurses to remove the catheter without requesting a physician order on the basis of an appropriate indication list. Nurse leaders must take into consideration that nurses, when given the autonomy, such as the use of an evidence-based protocol to make nursing decisions, and equipped with the proper education, they can have a phenomenal effect on nursing outcomes and practice issues. The empowered nurse can decrease CAUTI rates, which can lead to increased patient satisfaction scores, higher-quality, safe care, better institutional reimbursement rates, and highly skilled knowledgeable nurses²⁵.

As an update to our prior systematic review and meta-analysis of 14 studies published prior to August 2008, this systematic review (through October 2012) identified a total of 30 studies employing reminders and/or stop orders to prompt removal of unnecessary urinary catheters that reported at least one CAUTI or urinary catheter. The majority (28) of studies were pre-post designs, including three with concurrent controls; one study was a randomised control trial (RCT) and one study was a non-randomised crossover trial.

With very similar results to the prior meta-analysis, the updated meta-analysis using 11 studies indicated the rate of CAUTI (episodes per 1000 catheter-days) was reduced by 53% (rate ratio 0.47; 95% CI 0.30 to 0.64, $p<0.001$) with use of a reminder or stop order, with five of these studies also including interventions to restrict initial catheter placement. Based on this updated meta-analysis, reminders and stop orders could result in large numbers of avoided CAUTI episodes per 1000 catheter-days, particularly when baseline rates of CAUTI are high. Eight studies provided sufficient detail for pooling of the cumulative risk of CAUTI during the study period; the risk ratio for CAUTI was 0.72 (95% CI 0.52 to 0.99; $p=0.045$) for the intervention versus comparison groups. Using nine studies with sufficient detail for pooling, the pooled standardised mean difference (SMD) in duration of catheterisation was -1.06 days overall ($p=0.065$) including a statistically significant decrease in studies that used a stop order (SMD -0.37; $p<0.001$) but not in those that used a reminder (SMD, -1.54; $p=0.071$). Many studies reported other outcomes for urinary catheter use, but none of the studies identified since the prior meta-analysis provided sufficient detail (e.g., number of patients in intervention or control groups, and measures of variability such as SD) to update the prior meta-analyses for these other urinary catheters use outcomes²⁶.

Recommendations for improvement of adherence and EU Joint Action on AMR

The following table shows in which EU Joint Action guidelines for CAUTI Prevention fits the recommended interventions to improve adherence.

EU Joint Action on AMR

	Regular education / training/awareness	On-going surveillance	Bundles' check lists	Regular internal suit programs	Protocols to restrict catheter placement	Urinary catheter kits/sets	Reminder and stop interventions
Avoid unnecessary urinary catheters	✓	✓	✓	✓	✓	✗	✗
Closed collection system	✓	✓	✓	✓	✗	✓	✗
Catheters as small size as possible	✓	✓	✓	✓	✗	✓	✗
Insertion - aseptic technique	✓	✓	✓	✓	✗	✓	✗
Maintenance - aseptic technique and avoid unnecessary manipulation	✓	✓	✓	✓	✗	✓	✗
Review urinary catheter necessity daily and remove promptly if not indicated	✓	✓	✓	✓	✗	✗	✓

QUALITY INDICATORS

For the elaboration of the consensus, the methodology of the nominal group and the Delphi was followed. First, a multidisciplinary group of 6 urologist (3) and nurses (3) with experience in urology and the management of urinary catheters designed the indicators according to previous guidelines in the management of urinary catheters and previous documents in the prevention of catheter urinary tract infections such as the Project “Prevention of catheter urinary tract infection in patients in intensive care unit. UTI-ZERO”. Based on the information gathered as previously described, a proposal of quality indicators was made and submitted to Delphi vote.

Hospitals included in the projects are the following: Hospital Universitario 12 de Octubre (Madrid), Hospital Universitario Clínico San Carlos (Madrid), Hospital Nacional de Paraplégicos de Toledo.

The study developed initially 11 QI, but based on experts’ recommendation, this report highlights the top 6 of these QIs.

1: Percentage of patients with CAUTI in relation to the total number of patients

Formula	$\frac{\text{No. of patients with CAUTI}}{\text{Total No. of patients}} \times 100 \text{ patients}$		
Population	All hospitalised patients	Data Source	Clinical documentation
Frequency	Six-monthly	Standard	≤ 5%

2: Percentage of healthcare professionals with specific training on CAUTI prevention

Formula	$\frac{\text{Number of health professionals trained in ZERO-UTI}}{\text{Total number of health professionals assigned to the departments included}} \times 100$		
Population	Health professionals assigned to the departments included	Data Source	Structural survey*
Frequency	Six-monthly	Standard	10% decrease in the use of antibiotics in patients with CAUTI

*This survey must be defined by each Hospital in a later phase of the implementation of this position recommendation and within the defined training programme.

Indicator 3: Percentage of patients with correct urinary catheter indication

Formula	$\frac{\text{No. of patients with correct urinary catheterisation indication}}{\text{Total number of urinary catheter-bearing patients}} \times 100$		
Population	All patients admitted with a bladder catheter	Data Source	Clinical documentation
Frequency	Six-monthly	Standard	> 80%

Indicator 4: Percentage compliance with urinary catheter maintenance measures from the checklist in patients fitted with a urinary catheter

Formula	$\frac{\text{Number of UC maintenance measures carried out}}{\text{Total number of UC maintenance measures on the checklist}} \times 100$		
Population	All patients admitted with a bladder catheter	Data Source	Clinical documentation
Frequency	Six-monthly	Standard	> 80%

Indicator 5. Indicator of checklist for removal of urinary catheter

Formula	$\frac{\text{Number of UC-bearing patients with removal criteria}}{\text{Total number of urinary catheter-bearing patients}} \times 100$		
Population	All patients admitted with a bladder catheter	Data Source	Clinical documentation
Frequency	Six-monthly	Standard	< 20%

Indicator 6. Indicator of patients with CAUTI in which a urinary catheterisation set has been used (complying with the specifications in Annex II). Percentage of patients with CAUTI with catheterisation set in relation to the total number of patients with CAUTI in all hospital units

Formula	$\frac{\text{No. of patients with CAUTI and urinary catheterisation set}}{\text{Total number of patients with CAUTI}} \times 100$		
Population	All hospitalised patients	Data Source	Clinical documentation
Frequency	Six-monthly	Standard	> 80%



ANNEX 1: GLOSSARY

Aseptic technique: using practices and procedures to prevent contamination from pathogens. It involves applying the strictest rules to minimise the risk of infection.

Asymptomatic bacteriuria: presence of bacteria in the properly collected urine of a patient that has no signs or symptoms of a urinary tract infection.

Bacteriuria: presence of bacteria in urine.

Catheter: a tubular, flexible instrument, passed through body channels for withdrawal of fluids from (or introduction of fluids into) a body cavity.

Cystitis: inflammation of the bladder.

Drainage bag: collects urine from a catheter or penile sheath.

Closed urinary drainage system: consists of a catheter inserted into the urinary bladder and connected via tubing to a drainage bag. The catheter is retained in the bladder by an inflated balloon.

Haematuria: presence of blood in the urine.

Long-term catheterisation: when a person uses a urinary catheter for at least 4 weeks.

Lubricating gel: substances that help smooth the process of insertion and removal of the catheter. Applied on the outer surface of the catheter, they are made of a natural water-soluble gum substance.

Microorganism: an organism that can be seen only through a microscope. Microorganisms include bacteria, protozoa, algae, and fungi. Although viruses are not considered living organisms, they are sometimes classified as microorganisms.

Pathogen: usually defined as a microorganism that causes, or can cause, disease.

Prostatitis: swelling and inflammation of the prostate gland.

Pyelonephritis: inflammation of the kidney, typically due to a bacterial infection.

Sepsis: when bacteria and their toxins circulate in the blood leading to organ damage or blood poisoning.

Short-term catheterisation: when a person uses a urinary catheter for less than 4 weeks.

Sterile: free from living organisms and especially microorganisms.

Suprapubic: refers to the region on the centre of the front wall of the abdomen immediately above the pubic bone.

Urinary catheter: a tube placed in the body to drain and collect urine from the bladder.

ANNEX 2: CONTENTS OF THE URINARY CATHETERISATION KITS/SETS

The contents of the bladder catheter set must follow the recommendations of the guidelines published in 2012 by the European Association of Urology Nurses, “Evidence-based Guidelines for Best Practice in Urological Health Care Catheterisation Indwelling catheters in adults Urethral and Suprapubic” (Evidence-based guidelines for best practice in urological medical care and catheterisation with long term indwelling catheters in adults, bladder and suprapubic) to ensure that their use is effective in preventing CAUTI and for patient comfort.

This Annex indicates extensively the main characteristics that the set should have.

Urinary Catheter

Material

Latex, made from natural rubber, is a flexible material, although it has some disadvantages. Because of the potential discomfort due to high surface friction, vulnerability to rapid encrustation by mineral deposits from the urine and the implication of latex allergic reactions in the development of urethritis and urethral stricture or anaphylaxis, the use of latex catheters is not recommended. Given that many hospitals in worldwide currently have a "latex-free" policy and that the duration of catheterisation cannot always be determined at the time of insertion, many institutions have chosen to standardise the 100 % silicone substrate.

Silicone catheters (100%) might be preferable to other catheter materials to reduce the risk of encrustation in long-term catheterised patients who have frequent obstruction of the catheter. The silicone catheter (100% silicone) is very gentle for the tissue and is hypoallergenic. Since it is not coated, it has a relatively large lumen and therefore silicone catheters may be preferable to those made from other materials for reducing the risk of encrustation in catheterised patients in the long term. While silicone causes less tissue irritation and potential damages, the catheter balloon has a tendency to lose fluid which increases the risk of displacement. Silicone catheters also have a greater risk for developing a cuff when deflated, which can result in uncomfortable catheter removal or urethral trauma. A Cochrane review from 2007 did not find sufficient evidence to determine the best type of long-term indwelling catheter for prolonged bladder drainage in adults.

Hydrogel-coated catheters are soft and highly compatible. As they are hydrophilic, they absorb liquid, forming a soft coating around the urethra that reduces friction and urethral irritation. Hydrogel-coated silicone Foley catheters have a lubricated coating that can reduce urethral irritations that cause infection.

Diameter and length of the urinary catheter

Catheter diameter sizes are measured in Charrière (Ch or CH) also known as French Gauge (F, Fr or FG) and indicate the external diameter. 1 mm = 3 Ch and the sizes range from 6 to 30 Ch.

For paediatric use	6-10 Ch:	
For adults	10 Ch:	Clear urine, no detritus, no incrustation
	12-14 Ch:	Clear urine, no detritus, no incrustation and no haematuria
	16 Ch:	Slightly cloudy urine, slight haematuria with or without small clots, slight incrustation, and slight detritus
	18 Ch:	For moderate to intense incrustation, moderate to intense detritus or haematuria with moderate clots
	20-24 Ch:	Used for severe haematuria, need for urethral bladder flushing

For routine urinary catheterisation of most patients in the absence of detritus, clots or other factors, we recommend the use of 12-16 Ch size catheters. The inner lumen of the catheter varies between the different catheter materials, e.g. latex and silicone catheters, so inserting a larger Charrière catheter does not necessarily ensure a wider drainage channel.

Filling

Following the general guidelines for use, sterile water should be used for filling all types of urinary catheters, bearing in mind that sometimes, especially in the case of silicone, a small volume may be leaked and pass into the bladder, highlighting the importance of using sterile or distilled water to prevent possible infections. Some manufacturers recommend filling the balloon with an aqueous solution of 10% glycerine. Apart from the manufacturers' recommendations, there are no studies available on the use of water versus glycerine in the balloon. Therefore, compliance with the manufacturers' instructions for use should be confirmed before using any solution other than sterile water. Some urinary catheter manufacturers supply pre-filled syringes with sterile water in the packaging, which can assist in complying with local guidelines.

Contents of kit/set:

Catheters	Recommendation
Latex-free 100% Silicone urinary catheter	Highly recommended
Availability of kits/sets with different catheter sizes and lengths	Highly recommended
Lubricous coating on silicone substrate	Recommended
Syringes pre-filled with sterile/distilled water	Highly recommended

Drainage bags

The use of pre-connected drainage systems is recommended so as to reduce the risk of disconnections, where the catheter is pre-connected to the drainage bag in a sterile set (Study in the British NHS (British Journal of Nursing, 2019, Vol 28, No 1)) with a visible tamper-proof security seal to protect the connection. Thus, in case of accidental or deliberate disconnection, it provides clear evidence of the disconnection.

Drainage bags must have an anti-reflux system, an anti-reflux valve or chamber to prevent the back-flow of contaminated urine from the bag into the tube.

Drainage bags must have a port for collecting samples of urine, while at the same time maintaining a closed system. Bags with a needle-free sample collection port should be used in order to avoid sharps injuries.

It is recommended that the cap for the urinary catheter inflation valve be clearly labelled with the size in Charrière and the balloon inflation volume in ml.

Drainage Bags	Recommendation
Closed drainage system: pre-connected, sealed and security banded catheter tube and bag connections	Highly recommended
Antireflux valve or chamber	Highly recommended
Needle free sample port	Highly recommended
Catheter inflation valve cap labelled with size in Charrière and the balloon inflation volume in ml.	Recommended

Lubricating gels

The lubricant dilates and lubricates the urethra. It should be administered in a syringe to facilitate insertion of the gel into the urethra in accordance with local practice. The lubricant does not need to be antiseptic or anaesthetic, but it must be sterile and single use (single dose).

If a lubricant containing lignocaine/lidocaine or chlorhexidine is used, it is essential to ask the patient if they are hypersensitive to lignocaine/lidocaine, chlorhexidine or latex before the procedure begins. There have been reported cases of anaphylaxis attributed to the chlorhexidine component in lubricating gel. Care should also be taken if the patient has an open wound or severely damaged mucous membranes and/or infections in the areas where the lubricant is to be used. For patients with severe disorders of the impulse conduction system or epilepsy, or women in the first trimester of pregnancy or who are breastfeeding, permission should be sought from the urologist before using a lubricant containing lignocaine/lidocaine.

Four types of lubricants can be distinguished:

- ★ Water soluble lubricants without antiseptic or anaesthetic agents (recommended)
- ★ Water soluble lubricants with chlorhexidine (antiseptic)
- ★ Water soluble lubricants with anaesthetic lignocaine/lidocaine
- ★ Water soluble lubricants with anaesthetic lignocaine/lidocaine and chlorhexidine

Contents of kit/set:

Lubricating Gels	Recommendation
A syringe pre-filled with lubricating gel should form part of the set	Highly recommended
The lubricating gel should not contain any anaesthetic or antiseptic	Recommended

Urinary catheter securing device

Catheter securing devices are designed to prevent excessive traction of the urinary catheter against the neck of the bladder or accidental removal of the catheter. If the urinary catheter is not secured properly, it may migrate from its intended point of stabilisation. Stabilisation of the urinary catheter can reduce adverse events such as displacement, tissue trauma, inflammation and urinary tract infection. Urethral trauma can be caused by any size of catheter or by forced insertion of the catheter. Urethral trauma should be minimised by using an appropriate lubricant and the smallest possible catheter size.

Inflammation and trauma may also occur when the device is unsecured. Movement-induced trauma can lead to urinary tract infection and tissue necrosis. The use of a securement device reduces both the physical and psychological trauma to the patient by decreasing the need for reinsertion. If the catheter bag becomes too heavy with urine, and it is not supported properly, the bag can pull on the catheter. This, along with urinary catheter movement at the site of insertion, can cause discomfort and irritation to the patient.

Stabilising/Securement devices are available for the catheter without tape, including a rotating fixing mechanism with a breathable patch and alcohol-soluble adhesive. The swivel-type securement mechanism with a hermetic seal stabilises the catheter to prevent it from moving or being accidentally displaced.

Contents of kit/set:

Urinary Catheter Securing Device	Recommendation
Stabilisation/Securement device of the catheter	Highly recommended
Stabilising/Securement devices for the catheter without tape, including a rotating fixing mechanism with a breathable patch and an alcohol-soluble adhesive	Recommended

Hygiene and sterility

The following elements are essential for sterile insertion:

- ★ Sterile outer wrap to allow for sterile product to be placed in the sterile field
- ★ Disposable sterile apron for the healthcare professional
- ★ Under-pad with a waterproof layer
- ★ Sterile non-latex gloves with clear instructions provided with them which describe the correct sterile technique
- ★ Windowed cloth to isolate the insertion area and contribute to maintaining sterility
- ★ Square gauze to facilitate cleaning of the urinary meatus
- ★ Two syringes with sterile/distilled water for cleaning (clearly labelled as such)
- ★ Empty syringe to facilitate deflation of the catheter balloon during catheter changes
- ★ Plastic protective bag (sleeve) surrounding the catheter to prevent direct handling

Contents of kit/set:

Hygiene/Sterility	Recommendation
Sterile outer wrap	Highly recommended
Sterile, latex-free gloves	Highly recommended
Apron (preferably sterile)	Highly recommended
Sterile underpad sheet with waterproof moisture barrier layer	Recommended
Fenestrated drape	Highly recommended
Gauze squares for cleaning	Highly recommended
Two syringes with sterile water for cleaning	Highly recommended
Empty syringe to facilitate catheter removal in catheter exchange	Recommended
Plastic protective bag surrounding the catheter to prevent direct handling	Recommended
Clamp	Highly recommended

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ABOUT THE ENSH

The European Network for Safer Healthcare is an informal group of health stakeholders working together to ensure patient and healthcare workforce safety is in the EU policy limelight.

Its members include Health First Europe, the European Federation of Clinical Chemistry and Laboratory Medicine, the European Health Management Association, the European Specialist Nurses Organisation, the European Society for Emergency Medicine, the Global Alliance for Infections in Surgery, the Global Sepsis Alliance, the International Alliance of Patients' Organisations, the World Alliance Against Antibiotic Resistance, the European Union of Private Hospitals and the European Network to Promote Infection Prevention for Patient Safety.

The network's mission is to represent a constructive, vigilant and responsive third-party voice to support European and national initiatives aimed at enshrining best practices in patient safety in the EU.

The Secretariat of the ENSH is managed by Health First Europe.

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This report has been made possible by an unrestricted educational grant by:
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