CATHETER MAINTENANCE
WITH URO-TAINER® POLIHEXANIDE
IMPROVING PATIENT QUALITY OF LIFE
“Catheter maintenance helps to prevent UTIs and discomfort, maintains dignity and reduces the risk of blockage.”

Specialist Continence Nurse, UK
Introduction

Patients with indwelling urinary catheters are at high risk of developing complications such as infection and encrustation. In turn complications may lead to blockage and leakage of urine and the patient may require emergency removal of the catheter. As the majority of patients with living with an indwelling catheter are elderly or those with long-term disabilities this may have a significant impact on their quality of life as unnecessary removal of a catheter can be both embarrassing and painful. It is not difficult to imagine the effect of repeated catheter removal on patients who lack mobility and the ability to look after themselves.

For patients living with long-term indwelling urinary catheters there is a strong rationale for on-going catheter maintenance to prevent complications and maximise the life of the catheter together with patient comfort and quality of life.

For over 25 years the Uro-Tainer® technology and solutions have been used in clinical practice to manage encrustation and debris formation. A new addition to the Uro-Tainer® product line is Uro-Tainer® Polihexanide, which contains polihexanide. Uro-Tainer® Polihexanide is a novel concept in catheter maintenance as it provides both the means of routine mechanical rinsing together with bacterial decolonisation of indwelling urinary catheters.

This first edition of this brochure has been structured to provide you with the rationale for this new technology together with the key features of Uro-Tainer® Polihexanide.

Key content:

- The impact of catheter-related complications on patient health and quality of life
- Bacterial colonisation, biofilm formation and the development of catheter-related complications
- Role of polyhexanide and prevention of bacterial colonisation in urinary catheters
- The principles of catheter management and maintenance
- Uro-Tainer® heritage and clinical experience
- An overview of the Uro-Tainer® Polihexanide device

Next edition

The next edition of this brochure will contain updates on clinical experience with Uro-Tainer® Polihexanide and its role in the management of patients with long-term indwelling urinary catheters.
The Rationale for Catheter Maintenance

Indwelling urethral and suprapubic catheters are used for the long-term management of intractable urinary incontinence or bladder outlet obstruction resulting in urinary retention.¹

The use of indwelling urethral catheters is commonplace in both hospital and community healthcare settings.²⁻⁷ It has been estimated that 2 million urethral catheters are passed each year in the UK.⁴,⁵ In a survey of UK nursing homes an average of 9% of residents had indwelling urinary catheters.⁶ Similar levels of use are also seen in other countries.⁷ In nursing homes in the US it is estimated that 8–10% of residents use indwelling catheters.² The duration of catheter use in the home setting has been estimated at a mean of 6 years in a US study, with some individuals using them for up to 20 years.⁷,⁸

Patients treated with long-term catheterisation are a heterogeneous group, many of which are elderly people who have chronic disabilities.⁸,⁹ Despite stricter usage policies the overall numbers of patients with an indwelling urinary catheter is likely to increase in the future due to ageing of the population.⁶

Complications

Long-term catheterisation can lead to significant morbidity and mortality caused by associated complications.⁸ The most common complications that occur are urinary tract infection (UTI) and catheter blockage, which can affect up to 70% of catheterised patients.¹,⁹ Blockage, in turn can lead to leakage, or bypassing of urine and discomfort and embarrassment for the patient.¹ At least 50% of catheterised patients suffer with encrustation which is one of the main causes of blockage (Figure 1).¹⁰,¹¹

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**Urethral catheters passed each year in the UK**⁴,⁵

- **2 million**

**% of residents with indwelling urethral catheters**
- in UK nursing homes⁶: 9%
- in US nursing homes⁷: 8–10%

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*Figure 1: Catheter with Encrustation*
The outcome of a US survey of 202 adults living in the community with long-term indwelling urinary catheter users is outlined in Figure 2. This study demonstrated that catheter-associated complications contributed to additional healthcare utilisation, including extra nurse or clinic visits, trips to the emergency department and hospitalisation.

In a UK survey of 467 patients, catheter-associated complications resulted in over 500 emergency referrals during a six-month period. In a UK survey of 467 patients, catheter-associated complications resulted in over 500 emergency referrals during a six-month period. Catheter-associated complications may also significantly impact the health-related quality of life (HRQoL) of users. A study in adult patients reported dependence on the proper functioning of the catheter bag and feelings of vulnerability if the bag failed together with embarrassment at public wetting episodes. The risk factors for catheter-related complications and especially bacteriuria include female gender, older age and length of time the catheter has been in situ.

Figure 2: Catheter-Associated Complications in a Community-Based Population

Adapted from: Wilde MH et al.
Urinary tract infection, encrustation and catheterisation

Healthcare associated infections (HAI) cause substantial patient morbidity and increase cost of care for healthcare providers. It is estimated that approximately 6.4% of adult patients in acute hospital settings in the UK have a HAI. Catheter-associated urinary tract infections (CAUTI) are the second largest group accounting for 17.2% of all HAI. The cumulative risk of development of bacteriuria increases with duration of catheterisation. Therefore approximately 50% of patients catheterised for longer than 7 – 10 days contract bacteriuria. Around 20 – 30% of patients with catheter associated bacteriuria will develop symptoms of CAUTI. Many of these infections can be serious and lead to significant morbidity and mortality. Between 1 – 4% of patients with CAUTI will develop bacteraemia and of these 13 – 30% will die as a result. The length of hospital stay is also prolonged in patients who develop CAUTI and healthcare costs are increased as a result.

The bacteria gain access to the urinary tract either extraluminally or intraluminally. Enteric pathogens (e.g. *Escherichia coli*) are most commonly responsible, however, *Pseudomonas* species, *Enterococcus* species, *Staphylococcus aureus*, coagulase-negative staphylococci, *Enterobacter* species and yeast also are known to cause infection. Bacteria quickly develop into colonies known as ‘biofilms’, which adhere to the catheter surface and drainage bag. Such bacteria are morphologically and physiologically different from free-living planktonic bacteria. Biofilms can cause problems especially if the bacteria produce the enzyme urease, such as *Proteus mirabilis*. As a result urine then becomes alkaline, causing the crystallisation of calcium and magnesium phosphate within the urine, which is then incorporated into the biofilm resulting in encrustation of the catheter over a period of time. Encrustation is generally associated with long-term catheterisation, since it has a direct relationship with the length of catheterisation.

Further information about bacterial colonisation, biofilm formation and urinary catheterisation is outlined in the following module.

Catheter blockage

There are several reasons why a urinary catheter may become blocked including calcification (encrustation), debris formation and constipation. Causes of debris formation may originate from accumulation of cells from the bladder wall, infection and blood resulting from surgery. However, encrustation is the most common cause of blocked catheters. A Dutch study reported that less than 20% of catheters in a nursing home setting were replaced according to a once a month protocol. In the remaining patients early, unscheduled replacement was necessary due to obstruction or persistent leakage.

Encrustations may cover the balloon and also obstruct the lumen. These deposits can be extremely hard and cause trauma to the bladder wall and also to the urethra on catheter withdrawal. This damage may provide urinary bacteria access to the deeper tissues of the tract. Blockage of the catheter lumen may also lead to retention of urine and painful distension of the bladder. As bacteriuria are associated with encrustation and blockage, retention can facilitate ascending

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Figure 3: Calcification Process

- **Bacteria**
- **Urease**
- **Ammonia**
- **Carbon dioxide**
- **pH 6.8 - 9.5**
- **Crystal precipitation**
- **Calcification**
infection of the urinary tract resulting in onset of pyelonephritis, septicaemia and in some cases shock.\textsuperscript{24} Unnoticed blockage can be very dangerous, especially in the community where professional care may not be immediately available.\textsuperscript{23}

From a management perspective catheter wearers can be categorised as "blockers" or "non–blockers".\textsuperscript{24} 'Blockers' are defined as individuals whose catheter has become totally clogged or occluded, leaving only a narrow channel for flow of urine.\textsuperscript{24} Studies have found that over half of catheter wearers are 'blockers' and that blocker status may be associated with female sex and poor mobility.\textsuperscript{24,25} Blockers excrete more alkaline urine containing less magnesium, urea and phosphate.\textsuperscript{24} The urine of blockers was also more commonly colonised by \textit{Proteus mirabilis} and \textit{Providencia stuartii}.\textsuperscript{26}

**Management options**

Catheter removal may be the only management option for catheter blockage and recurrent infection.\textsuperscript{7} However, frequently changing an indwelling catheter may lead to increased risk of infection and further discomfort and embarrassment for the wearer.\textsuperscript{5,27} Therefore there is a strong rationale for a catheter maintenance strategy, which will help prevent the development of catheter-associated complications and frequent removal. The following modules explore this rationale in more depth and also focus on the benefits of catheter maintenance with Uro-Tainer\textsuperscript{®} and the newly developed Uro-Tainer\textsuperscript{®} Polihexanide.

**Key points:**

<table>
<thead>
<tr>
<th>COMPLICATIONS</th>
<th>Urinary catheterisation is a common intervention and can lead to complications developing in a high percentage of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEGATIVE IMPACT</td>
<td>Catheter-associated complications may negatively impact patient morbidity and mortality and drive up healthcare costs</td>
</tr>
<tr>
<td>ANTIBIOTIC RESISTANT</td>
<td>Catheter-associated infection is often antibiotic resistant due to the development of bacterial biofilm</td>
</tr>
<tr>
<td>REMOVAL</td>
<td>Catheter removal may be the only management option for catheter blockage and recurrent infection</td>
</tr>
<tr>
<td>INFECTION &amp; DISCOMFORT</td>
<td>Frequently changing an indwelling catheter may lead to increased risk of infection and discomfort for the wearer</td>
</tr>
</tbody>
</table>

**DUTCH STUDY REPORT**

**NURSING HOME**

\% of catheters replaced on a monthly basis >20%
**Bacterial Colonisation and Catheter-Associated Complications**

The bacterial colonisation of urinary catheters is aided by the formation of biofilm, which protects the microorganisms and makes them difficult to eradicate.\(^{28-30}\) This module focuses on the specific characteristics of biofilm and the role they play in catheter-associated complications.

**What are biofilms?**

- Biofilm forms when bacteria adhere to surfaces in moist environments by excreting a thick, slimy, glue-like substance\(^{28}\).
- This substance forms a protective layer and the bacteria can no longer leave the surface; new bacteria are produced and the colony grows\(^ {28}\).
- The protective layer makes it hard to remove the bacteria by cleaning and it also shields them from external threats such as antibiotics\(^ {28,29}\).
- A biofilm typically consists of a mixture of many species of bacteria as well as other microorganisms (e.g. fungi) and debris\(^ {28}\).
- Biofilms occur in the natural environment as well as industrial and hospital settings where they may act as a source of infection\(^ {30}\).

<table>
<thead>
<tr>
<th>CHRONIC WOUNDS</th>
<th>ACUTE WOUNDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(click for data)</td>
<td>6% contained biofilm structures(^ {31})</td>
</tr>
</tbody>
</table>
How do biofilms form?\textsuperscript{28,36,37}

**Stage 1 Reversible surface attachment**
Free-floating planktonic bacteria start to attach to surfaces and form biofilms
The initial attachment can happen within minutes and is weak and reversible

**Stage 2 Irreversible surface attachment**
As the bacteria multiply they become more firmly attached to the surface and start to differentiate
Gene expression of the bacteria changes in ways that promote survival
Strongly attached microcolonies can form within 2 – 4 hours

**Stage 3 Maturation**
Once firmly attached to the surface the bacteria start to excrete a substance known as extracellular polymeric substance (EPS), which forms a protective barrier
Various enzymes secreted by bacteria e.g. urease help the biofilm become firmly attached to the surface of the device, wound etc
Fully mature biofilm that are extremely resistant to antimicrobials and shed planktonic bacteria can evolve within 2 – 4 days
At this stage biofilm can rapidly recover from mechanical disruption and reform mature biofilm within 24 hours

Why are biofilms important in the healthcare setting?
- Biofilms are commonly found in chronic wounds and may delay healing.\textsuperscript{28} In biopsy specimens taken from chronic wounds 60\% contained biofilm structures compared to only 6\% of biopsies taken from acute wounds.\textsuperscript{31}
- Biofilms are a major contributor to medical conditions such as periodontal disease and osteomyelitis which are characterised by underlying bacterial infection and chronic inflammation.\textsuperscript{32-34}
- Biofilms are also known to form on the surface of medical devices such as orthopaedic and breast implants, urinary catheters, contact lenses and sutures.\textsuperscript{33,35}
How do mature biofilms protect bacteria?

Blocking
EPS protects microbes by preventing large molecules such as antibodies penetrating the biofilm protective barrier. Mature biofilms may also act as a diffusion barrier to small molecules such as antimicrobial agents e.g. antibiotics

Mutual protection
The different microbial species within the biofilm may provide cooperative protection for each other. For example antibiotic resistant bacteria
- May secrete protective substances that can protect neighbouring non-antibiotic resistant bacteria in the biofilm or
- Transfer genes to other bacteria that confer antibiotic resistance

The specific characteristics of the EPS of biofilms established by one microbial species can enable other species to attach and incorporate into an existing biofilm

Hibernation
Bacteria within biofilms have developed the ability to become metabolically inactive i.e. hibernate as a survival strategy. Bacteria need to be metabolically active for antibiotics to act. Therefore hibernating bacteria in biofilms are often unaffected by antibiotics

Bacterial colonisation and urinary catheterisation
The catheterised urinary tract provides ideal conditions for the development of large bacterial colonies, which adhere to the catheter surface and drainage bag

Proteus and Pseudomonas species are the organisms most commonly associated with biofilm growth on catheters. When methicillin-resistant Staphylococcus aureus (MRSA) and Pseudomonas aeruginosa are both present accelerated biofilm development was observed

The most troublesome complications are the crystalline biofilms that may block the catheter lumen and trigger episodes of pyelonephritis and septicaemia

These crystalline biofilms result from infection by urease-producing bacteria and specifically Proteus mirabilis
The enzyme urease raises the urinary pH and drives the formation of calcium phosphate crystals in the biofilm\textsuperscript{17,45}

All types of catheter are vulnerable to encrustation by biofilms\textsuperscript{46}

Therefore clinical prevention strategies are needed as

- Bacteria growing in the biofilm mode are resistant to antibiotics\textsuperscript{45}

- Frequently changing an indwelling catheter due to encrustation can result in an increased risk of infection and discomfort for the catheter wearer\textsuperscript{5,27}

**Bacterial decolonisation: Preventing biofilm formation**

Studies have shown that the lowest concentration required to eradicate bacterial biofilm for many antibiotics may exceed the maximum therapeutic dose level\textsuperscript{44-48}

Therefore standard therapeutic doses of antibiotics may have little or no effect on bacteria in biofilm form in the patient i.e. in wounds or on the surface of medical devices\textsuperscript{28}

There is evidence to suggest that physical removal i.e. mechanical rinsing is the best method of biofilm removal\textsuperscript{28}

Regular cleansing is required to prevent regrowth of the biofilm\textsuperscript{28}

Topical broad spectrum antimicrobial agents that kill rather than inhibit microorganisms may be the most appropriate agents to use for mechanical rinsing\textsuperscript{28}

Polyhexanide is a broad spectrum microbicidal antimicrobial which has been successfully used for bacterial decolonisation and prevention of biofilm formation in wound management\textsuperscript{28}
Polyhexanide in prevention of bacterial colonisation

**Background**
The objective of the study was to compare the efficacy of a range of commonly used wound irrigants on biofilm formation with *Pseudomonas aeruginosa*.

Polyhexanide (Prontosan®, Wound Irrigation Gel, Gel X and Solution) was chosen as one of the test solutions as it has been shown to prevent biofilm formation in chronic wounds.

This study has relevance to bacterial decolonisation of urinary catheters as:
- Silicone tubing was used as a carrier material for the biofilm formation.
- *P. aeruginosa* is a bacteria commonly found in catheter biofilm.

**Study design**
A clean silicone tube was incubated for a 10-week period with *P. aeruginosa*.

The tube was cut into 24 sections for use as test and control carriers.

The bacterial load of 16 control sections was calculated.

Eight test sections harbouring biofilm were incubated for 24 h with either isotonic saline (NaCl), Ringer’s solution or polyhexanide solution.

**Results**
The baseline bacterial load (biofilm equivalent) of the test sections averaged 983 (± 394) EU/ml (Figure 5).

The polyhexanide solution significantly reduced the baseline biofilm bacterial load after 24 h by a factor of 7.8 or 87% (125 [± 67] EU/ml) (p<0.001).

The isotonic saline and Ringer’s solution had no effect on the bacterial load (984 [± 233] EU/ml & 1022 [± 557] EU/ml).
**Conclusions**

The polyhexanide solution significantly reduced the baseline biofilm concentration by 87% after 24 h.

The isotonic saline and Ringer’s solution had no effect on eradication of the biofilm.

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**Key Points:**

- Biofilm formation is an important issue for patients with long-term indwelling urinary catheters as they:
  - Act as a source of infection and are often resistant to antibiotic treatment and difficult to eradicate.
  - Cause encrustation and blockage resulting in removal of the catheter.
- Mechanical rinsing is the best method for biofilm removal and regular cleansing is required to prevent regrowth.
- Topical broad spectrum antimicrobial agents that kill rather than inhibit microorganisms may be the most appropriate agents to use for mechanical rinsing.
- Polyhexanide solution has been shown in studies to significantly reduce bacterial biofilm load compared to a range of other irrigation solutions e.g., Ringer’s solution.
The polyhexanide Experience

Polyhexanide

Polyhexanide (polyhexamethylene biguanide [Polihexanide]) has been developed as an improved, second generation compound, which belongs to the same chemical family as chlorhexidine (biguanide). Chlorhexidine is an antiseptic with both bacteriostatic and bactericidal mode of action, which has been used for many years in the healthcare setting. However, it is known to cause side effects such as allergy or local irritation. It may also produce a toxic degradation product called chloroaniline.

Polyhexanide has been shown to have distinct advantages over chlorhexidine as it has much higher tissue tolerability and is not so easily degraded. Polyhexanide has demonstrated good clinical safety, with no evidence of resistance and minimal toxicity.
Clinical use

Polyhexanide has now been used for over 17 years as an antiseptic ingredient across a wide range of products in the medical and dental fields. For example, polyhexanide is used in contact lens cleansers, mouthwashes and also in wound management products such as the Prontosan® range (B. Braun, Switzerland).38

The Prontosan® range of wound irrigation solution and gel is used for cleaning and decolonisation of skin, intact or compromised mouth and nose mucosa and wounds.38 They are used to manage a range of chronic and acute wounds including surgical and traumatic wounds; leg and pressure ulcers; diabetic foot ulcers and up to fourth degree burns.38 Prontosan® products can be used as an adjunct to systemic antibiotics as there is no evidence of systemic absorption, toxicity or bacterial resistance.50-52

Prontosan® contains polyhexamethylene biguanide (Polyhexanide) as the antimicrobial agent (0.1%) together with betaine, a surfactant (0.1%).38 As a result of its surfactant component, Prontosan® has a lower surface tension than that of water, making it a more efficient cleanser as it disrupts the biofilm and supports the physical removal of debris and bacteria.38

The primary indication for using Prontosan® products is to:
- Cleanse and decontaminate
- Aid removal of exudate
- Prevent biofilm formation
- Reduce wound odour

A number of studies have demonstrated the efficacy and safety of Prontosan® in wound management.53-60 An in vitro study found that Prontosan® was more effective at removing wound coating compared to four other rinsing solutions.56 Several clinical studies have also demonstrated a positive impact of using Prontosan® solution and gel in:
- Controlling the bacterial burden in infected leg ulcers59
- Reducing the bioburden, aiding wound healing and reducing the time to wound closure in patients with chronic wounds53-56

Figure 6:
The Effect of Prontosan® On Wound Healing
The Effect of Polyhexanide on Biofilm Formation

In addition to its bactericidal properties polyhexanide may also have an anti-adhesive effect due to its chemical nature (cationic).\textsuperscript{50,60} This may help in turn to minimise biofilm formation by preventing microorganisms attaching to surfaces and forming colonies.\textsuperscript{60} The anti-adhesive effect of polyhexanide on biofilm formation has been evaluated in an \textit{in vitro} study based on a human cell line (Figure 7).\textsuperscript{60}

This study focused on the effect of polyhexanide on a virulent strain of bacteria\textsuperscript{a}, which is known to form biofilms which are particularly hard to eradicate.

This type of bacteria is known form biofilms, which are particularly hard to eradicate as they adhere strongly to surfaces.

This bacteria is part of the family of group B streptococci (GBS).

The most common GBS biofilms are formed on the surfaces of urethral catheters\textsuperscript{61}

To test the anti-adhesive properties of polyhexanide in isolation sub-bactericidal concentrations were used.

\textbf{Study design}

- Two different genotypes (\textit{SspB1+} and \textit{SspB1-}) of \textit{S. agalactiae} were studied
- The \textit{SspB1+} genotype is more virulent, it exhibits high adhesive activity and is implicated in biofilm formation
- Sub-bactericidal concentrations of 0.5 and 0.25 \textmu g/ml polyhexanide were used and exposure times of 30 min and 2h
- The impact of polyhexanide on the adhesive strength and extent of the biofilm formation was measured

\textbf{Results}

The study demonstrated that for the \textit{SspB1+} genotype a 0.5 \textmu g/ml polyhexanide concentration led to significant decreases in the:

- Adhesive strength of the biofilm (95\% reduction)
- Percentage of infected cells (88\% reduced to 20\%)
- Mean number of adherent cells (77\% reduction)
- Similar results were seen for the weaker genotype (\textit{SspB1-}) and also for the 0.25 \textmu g/ml polyhexanide concentration.
Conclusions

- Sub-bactericidal concentrations of polyhexanide prevent adhesion of bacteria and biofilm formation

A further *in vitro* study has also demonstrated the positive effect of polyhexanide (Prontosan®) on the development of MRSA biofilm compared to two saline solutions in a porcine wound model.58

**Figure 7:**
The Effect of polyhexanide (Prontosan®) on Biofilm Formation

<table>
<thead>
<tr>
<th>Polyhexanide</th>
<th>Index of adhesion (IA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>1320</td>
</tr>
<tr>
<td>0.25 μg/ml</td>
<td>187.5 (−86%*)</td>
</tr>
<tr>
<td>0.5 μg/ml</td>
<td>70 (−95%*)</td>
</tr>
</tbody>
</table>

* vs baseline

IA of the biofilm cells at baseline and after incubation for 30 minutes with 0.25 μg/ml and 0.5 μg/ml polyhexanide. Results for *S. agalactiae SspB1* genotype only. Adapted from: Afinogenova AG et al.60

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**Polyhexanide in Catheter Maintenance**

In laboratory tests a polyhexanide solution has been shown to have bactericidal activity against a wide range of bacteria that are commonly associated with UTI in catheterised patients (e.g. *Proteus mirabilis*). Using a practice-like laboratory assay (i.e. standard silicone catheters incubated with clinically relevant bacteria) use of polyhexanide solution for bacterial decolonisation was shown to be superior to both standard practice (i.e. no treatment) and also saline solution.

A study focusing on the tolerability of a polyhexanide solution in catheterised patients is currently underway and results are expected to be available in 2015. (See page 32 -33 for more details of these studies and results.)

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**Key Points:**

- Polyhexanide has been
  - Used extensively in a range of medical applications over the last 17 years
  - Shown to be safe and effective in the prevention and treatment of wound infection
  - Used in conjunction with systemic antibiotics as there is no evidence of systemic absorption, toxicity or bacterial resistance
  - Shown to prevent biofilm formation due to its
    - Bactericidal activity
    - Ability to prevent bacteria gripping surfaces and forming colonies
  - Shown to have potential for use in catheter maintenance
Catheter Management and Catheter Maintenance

Intermittent, short-term, self-catheterisation (ISC) is the recommended first line option for many patients with voiding problems due to injury to the nervous system e.g. spinal cord injury. However, in patients with dexterity problems or where ISC is contraindicated self-retaining suprapubic or indwelling transurethral catheterisation may be the most appropriate option to manage voiding problems.

As already established in sections I and II, the long-term use of indwelling or suprapubic catheters is associated with a high complication rate including infection, encrustation and blockage. In turn this may lead to unnecessary removal of the catheter. Frequently changing an indwelling catheter can result in an increased risk of infection and discomfort for the catheter wearer. Effective catheter maintenance is required to prevent complications and unnecessary removal of the catheter.

"The benefit to the patient of using Uro-Tainer® for catheter maintenance is that they maintain normal physiology of the urethra by reducing frequent catheter changes."

Specialist Continence Nurse, UK
Identifying the cause of catheter blockage

Catheter blockage can result from a number of different causes. Therefore, discovering the exact cause of the blockage is important as this influences the choice of treatment approach. If the useful life of the catheter is threatened by encrustation or debris formation, intervention with the correct Uro-Tainer® rinse fluid, in addition to a healthy diet and sufficient fluid intake, can increase the catheter’s lifespan.

Blockages resulting from calcification and encrustation can usually be identified using a combination of the following:

- **pH-indicator** - Check urine pH regularly since alkaline urine (indicated by a high pH) is a strong indication of possible calcification. pH can be measured using common pH strips.

- **Culture** - Bacteria in the urine, such as *Proteus mirabilis*, in combination with alkaline urine create ideal conditions for the onset of calcification.

- **Inspection** - If it is suspected that a blockage has resulted from calcification, checking the catheter by cutting it open along its length after it has been removed is recommended. If the catheter is blocked and the blockage cannot be attributed to calcification this may be an indication that debris formation (i.e. from blood clots or mucus) is the cause of the blockage.

It is advisable to record the date of the very first catheter placement and the reason for the removal in the management plan. As a rule, a clear picture of the catheter’s lifespan arises after three to five catheters are evaluated.

The Uro-Tainer® Concept

The Uro-Tainer® device and solutions have been used for over 25 years in clinical practice for catheter maintenance. The Uro-Tainer® concept was developed to replace standard bladder irrigation using syringes to reduce the associated risks of contamination and excessive pressure and / or vacuum on the bladder wall.

The Uro-Tainer® system has been proven to reduce both the number of catheter changes required by the patient and also the need for rinsing compared to using syringes (see Figure 9). In turn this helps to prolong the catheter life span by preventing and eliminating encrustation and avoiding unnecessary withdrawal of a blocked catheter, which can be very painful and embarrassing for the patient.

Figure 8: pH Scale

![Figure 8: pH Scale](image)

Figure 9: Reduction in Necessary Catheter Changes Over 8 Weeks

![Figure 9](image)

Adapted from: Piet E & De Ridder D

‡ Uro-Tainer® Suby G
Uro-Tainer® The Product

The Uro-Tainer® product line consists of a 100 or 50 ml PVC-free bag with different fluids which have their own distinct indications for use to manage catheter blockage (see Table 2). Uro-Tainer® Suby G and Uro-Tainer® Solutio R are also available as a double bag to enable sequential rinsing with smaller volumes. Uro-Tainer® NaCl 0.9 % is also available with an injection port to enable administration of drugs. The Uro-Tainer® device is a closed system and is connected to the catheter and administered by gravity. After the instillation, the fluid is returned to the same bag.

Compared to alternatives the benefits of the Uro-Tainer® system are:

- Contamination is minimised and product safety enhanced as
  - The universal catheter tip is sterile and has an attached protective cap
  - It is a completely closed system
  - The exterior of the device is sterile when the package is opened

Patient comfort and safety is maximized as

- The device has a simple and safe operating mode (gravity as sole input and output force)
- It can be easily used by healthcare professionals as well as the patient

§ Uro-Tainer® Twin Suby G and Uro-Tainer® Twin Solutio R (2 x 30 ml bag)
** Uro-Tainer® M NaCl 0.9%

A new addition to the Uro-Tainer® product line is Uro-Tainer® Polihexanide, which is a novel concept in catheter maintenance. For the first time UT-Polihexanide provides the means of routine mechanical rinsing together with bacterial decolonisation for patients with suprapubic and indwelling urethral catheters.

The choice of Uro-Tainer® device and solution depends on the needs of the individual patient (see Table 2).
Irrigation with saline did not significantly reduce the encrustation in comparison to control (no irrigation)\(^{37,38}\). Encrustation was prevented and dissolved with a solution of citric acid (Uro-Tainer Suby G) having a pH of 4\(^{37,38}\).

Table 2:
Choosing the Correct Uro-Tainer\(^{\circledR}\) Solution

<table>
<thead>
<tr>
<th>Issue</th>
<th>Risk of bacterial colonisation</th>
<th>Blockage</th>
<th>Debris formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment objective</td>
<td>Prevention or reduction of adhesive cells</td>
<td>Prevent or remove encrustation</td>
<td>Mechanical rinsing or flushing</td>
</tr>
<tr>
<td>Recommended Uro-Tainer(^{\circledR}) solution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uro-Tainer(^{\circledR}) Polihexanide</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Uro-Tainer(^{\circledR}) NaCl</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Uro-Tainer(^{\circledR}) Suby G &amp; Uro-Tainer(^{\circledR}) Solutio R</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

Treatment frequency Go to page 38 for more details

Monitoring The catheter must be constantly monitored and documented while in place. The effectiveness of the Uro-Tainer\(^{\circledR}\) device and solution can then be evaluated and the management plan continued or amended accordingly.
Clinical Experience with Uro-Tainer®

The following clinical experience and best practice tips have been obtained from interviews with specialist continence nurses from the United Kingdom, Belgium and The Netherlands.

* Summary of feedback from interviews carried out in November 2013 with ten Specialist Continence Nurses in the United Kingdom, The Netherlands and Belgium. The nurses had over 5 years experience each of using the Uro-Tainer® system and solutions. In total they had used the system for catheter maintenance in over 500 patients.

![Specialist Continence Nurses](image)

**When do you initiate catheter maintenance in patients with long-term indwelling catheters?**

| Majority view: | If patients are requiring frequent catheter changes due to blocking or they experience bypassing of urine  
| | • Go back to basics and check the catheter is in the correct position and draining freely before going to the next stage  
| | • Ensure patients are following basic hygiene, drinking enough etc  
| | • Take into account catheter history and if they block more than three times and show signs of encrustation initiate catheter maintenance  |
| Additional points: | pH monitoring may be a useful additional tool to detect when the catheter is more likely to block  |
| Best practice tips: | Use a catheter diary or passport to detect issues at an early stage  
| | Encrustation can often be detected by  
| | • Observing the external colour of the catheter  
| | • Cutting the catheter along its length. If crystals are not visible they can often be felt like grains of sand  
| | • Do not just observe the tip for encrustation as this can be left behind on removal  
| | Patients and carers can be taught to monitor pH  |
Which Uro-Tainer® solutions do you use for catheter maintenance and why?

Uro-Tainer® Suby G for prevention of encrustation and maintain the patency of the catheter based on published evidence and best practice

The Uro-Tainer® Suby G Twin allows sequential administration of small volumes which is effective and more comfortable for the patient

Uro-Tainer® Solutio R is used if there is a specific problem i.e. the catheter is already blocked or if the patient experiences frequent blockage. Patients then revert to Uro-Tainer® Suby G

Uro-Tainer® NaCl is used if the blockage is due to debris formation (e.g. mucus, blood clots) alone

What do you think are the main benefits of Uro-Tainer® for the patient?

It improves patient quality of life as it:

- Avoids blockage and frequent catheter changes, which in turn reduces the risk of infection
- Maximises patient dignity through avoidance of emergency removal
- Is comfortable for the patient
- Helps to maintain normal physiology of the urethra

The system is proven and reliable, which increases patient confidence. Patients who are taught to self-administer Uro-Tainer® are empowered and free to manage their own time

Which type of patient benefits most from use of Uro-Tainer®?

Patients with long-term indwelling catheters who are immobile (e.g. who are chair or bed ridden) and those with co-morbidities

Is self-administration of Uro-Tainer® possible in some patients?

As the system is easy to use patients with greater dexterity may be taught to self-administer Uro-Tainer® e.g. those with Multiple Sclerosis or younger patients

This makes the patient and carer less dependent on the community nurse and improves freedom and quality of life

The practitioner needs to be reassured that the patient will recognise and act if any issues arise or is prompted to contact a healthcare professional if necessary

Ease of use

Quick to administer – only taking 5 minutes each side if using the Uro-Tainer® Suby G Twin

Small compact, sterile, single use, gravity fed device

The practitioner can observe what they are doing i.e. if the urine is clear or otherwise

Sequential instillation with one connection (Uro-Tainer® Suby G Twin)

Range of solutions for specific uses

Its use is based on published evidence and best practice

Summary of feedback from interviews carried out in November 2013 with ten Specialist Continence Nurses in the United Kingdom, The Netherlands and Belgium.
### Table 3: Uro-Tainer® Clinical Case Studies

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient’s medical history and indication for catheterisation</strong></td>
<td>Two failed trial removals of catheter after discharge home following a CVA. Patient had an indwelling urinary catheter inserted during the acute phase of his illness but has since been unable to void normally.</td>
</tr>
<tr>
<td><strong>Length of time the patient has been catheterised</strong></td>
<td>Approximately 18 months.</td>
</tr>
<tr>
<td><strong>Reason for choosing Uro-Tainer® for catheter maintenance</strong></td>
<td>The community nurses reporting that the catheter was blocking every 5-6 weeks, usually out of hours, requiring the patient to be taken to the emergency department of the local hospital for the catheter to be changed. On consultation with the Continence Nurse Specialist and following assessment of the patient, it was identified that the problem with blockage was due to encrustation. It was agreed to take a more proactive approach to this patient’s catheter management and use a catheter maintenance solution initially on alternate days.</td>
</tr>
<tr>
<td><strong>Uro-Tainer® solution or range of solutions used for catheter maintenance in this patient</strong></td>
<td>The solution prescribed for this patient was Uro-Tainer® Twin Suby G, which is our solution of choice for regular catheter maintenance.</td>
</tr>
</tbody>
</table>

CVA = cerebro-vascular accident
## Case 1
74-year old male treated in the community

<table>
<thead>
<tr>
<th>Length of treatment with Uro-Tainer®</th>
<th>Approximately 6 months.</th>
<th>Two years.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uro-Tainer® treatment regimen</strong></td>
<td>Initially alternate days but this has now been reduced to twice weekly intervals.</td>
<td>Twice-weekly and it is self-administered by the patient.</td>
</tr>
<tr>
<td><strong>Clinical impact of Uro-Tainer®</strong></td>
<td>By using a proactive approach it was identified that the time between catheter changes was gradually being extended. The catheter is now being changed 12-weekly with no problems in between.</td>
<td>Uro-Tainer® immediately solved the problem and the patient experienced no further catheter blockage or debris.</td>
</tr>
<tr>
<td><strong>Length of treatment with Uro-Tainer®</strong></td>
<td>Extending the time between catheter changes. Less urethral trauma with associated risk of infection from frequent re-catheterisation. Preventing unscheduled catheter changes which required a frail elderly man to be taken to the emergency dept. out of hours.</td>
<td>Use of Uro-Tainer® significantly improves patient quality of life.</td>
</tr>
<tr>
<td><strong>Learning points</strong></td>
<td>It is of vital importance to assess the patient fully to identify the exact cause of catheter blockage in order that the correct treatment regimen is implemented.</td>
<td>Some patients can be taught to self-administer Uro-Tainer®, which gives them greater independence.</td>
</tr>
</tbody>
</table>

*Proactive catheter maintenance with Uro-Tainer® avoids frequent catheter changes, which reduces the risk of both infection and need for emergency removal.*

— Specialist Continence Nurse, UK
**Uro-Tainer® Polihexanide**

For the first time the Uro-Tainer® Polihexanide device provides healthcare workers and patients with the means of routine mechanical rinsing together with bacterial decolonisation for patients with suprapubic and indwelling urethral catheters. By rinsing the catheter with the polyhexanide solution, the bacterial load is reduced and hygienic condition of the device is maintained. Prior to development of the UT-Polihexanide device, there was no other means of achieving bacterial decolonisation in catheterised patients. See Table 4.

**The Product**

UT-Polihexanide is a ready-to-use, disposable system, consisting of a PVC-free bag containing 100 ml of sterile solution, a flexible tube fitted with a clamp and a sterile universal connector protected by a plastic cap with a tamper proof seal. The system is overwrapped in a protective plastic envelope. See Figure 11.

The UT-Polihexanide device has a simple and safe operating mode (gravity as sole input and output force) like all the other Uro-Tainer® devices and can therefore be easily used by healthcare professionals as well as the patient. UT-Polihexanide is therefore an uncomplicated way for cleansing and decolonising urinary catheters, which avoids time-consuming procedures for healthcare personnel.

UT-Polihexanide combines the Uro-Tainer® device technology with a polyhexanide solution (as described in detail in the previous sections).

Uro-Tainer® medical devices have been used for more than 25 years for catheter maintenance. Compared to other catheter rinsing methods (sets requiring assembly, syringes etc), the sterile ready-to-use Uro-Tainer® system is a safe all-in-one procedure, which is comfortable for the patient. UT-Polihexanide uses the standard Uro-Tainer® 100 ml bag and is totally adapted to the intended use of the device.

**Solution**

<table>
<thead>
<tr>
<th>Solution</th>
<th>Intended Use</th>
<th>Characteristics/Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaCl 0.9 %</td>
<td>Rinsing of catheter</td>
<td>Mechanical rinsing</td>
</tr>
<tr>
<td>Suby G (3.23 % citric acid)</td>
<td>Rinsing of encrusted catheter</td>
<td>Chemical dissolution of crystals</td>
</tr>
<tr>
<td>Solutio R (6% citric acid)</td>
<td>Rinsing of encrusted catheter (persistent crystallisation)</td>
<td>Chemical dissolution of crystals Possible local intolerance due to high citric acid content</td>
</tr>
<tr>
<td>Chlorhexidine 1:5000</td>
<td>Treatment of catheter-related infection</td>
<td>Physician prescription required Known side effects of chlorhexidine diacetate</td>
</tr>
</tbody>
</table>

**Indications**

**Primary:** The routine mechanical rinsing of suprapubic and urethral catheters (i.e. removal of debris)

**Secondary:** Bacterial decolonisation of the catheter
The UT-Polihexanide solution contains a minimal number of constituents in order to minimise adverse events and therefore does not contain betaine (as used with Prontosan®). The twin bag system has not been utilised for UT-Polihexanide as bacterial decolonisation of the catheter is not enhanced by sequential rinsing with smaller volumes. There is also no need for an additional port, as the polyhexanide solution is not intended as a vehicle for drugs.

**Bacterial decolonisation**

The bactericidal activity of UT-Polihexanide has been tested against a wide range of bacteria that are commonly associated with development of UTI in catheterised patients. Using a well recognised and standardised laboratory test the UT-Polihexanide solution was shown to have bactericidal activity against test strains of *Staphylococcus aureus*, *Enterococcus hirae*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Proteus mirabilis* and *Klebsiella pneumonia*.

**Evidence**

Using a practice-like laboratory *(in vitro)* assay the decolonisation potential of the UT-Polihexanide solution has been tested against both no treatment (standard practice) and also Uro-Tainer® 0.9 % NaCl (sodium chloride).

Using similar methodology fluorescent microscopy was used to visualise the effect of UT-Polihexanide vs. Uro-Tainer® 0.9 % NaCl on biofilm formation. Figure 12 demonstrates the extensive effect of UT-Polihexanide on bacterial colonisation of the catheter surface.

**Figure 12:**
Uro-Tainer® Polihexanide vs. Uro-Tainer® 0.9 % NaCl on Biofilm Formation

---

**Results:**

**Biofilm treated with Uro-Tainer® Polihexanide 3D**

Most cells are red =

**Dead Bacteria**

**Biofilm treated with Uro-Tainer® 0.9 % NaCl 3D**

Most cells are green =

**Healthy Bacteria**
**Table 5: Bacterial decolonisation potential of Uro-Tainer® Polihexanide versus no treatment and Uro-Tainer® NaCl**

<table>
<thead>
<tr>
<th>Comparator</th>
<th>Test 1 (^{70})</th>
<th>Test 2 (^{71})</th>
</tr>
</thead>
<tbody>
<tr>
<td>No treatment (standard practice)</td>
<td>Uro-Tainer® NaCl</td>
<td></td>
</tr>
<tr>
<td>Study design</td>
<td>16 silicon catheters were artificially contaminated with clinically relevant bacteria and incubated for 72 hours</td>
<td>20 silicon catheters were contaminated with clinically relevant bacteria and incubated for 72 hours</td>
</tr>
<tr>
<td>Results</td>
<td>The difference in reduction of bacterial load between the groups was statistically significant in favour of UT-Polihexanide (p = 0.012)</td>
<td>The difference in reduction of bacterial load between the groups was statistically significant in favour of UT-Polihexanide (p = 0.034)</td>
</tr>
</tbody>
</table>

“The device was used according to clinical standards, therefore, it is expected that the results of the in-vitro assay are valid for clinical practice.” \(^{70,71}\)

**Conclusions**

- These laboratory tests have demonstrated the superiority of UT-Polihexanide for bacterial decolonisation of catheters compared with standard practice and also saline solution.\(^{70,71}\)
- The assays used in the two tests were designed to reflect clinical practice.\(^{70,71}\) Bacterial strains commonly associated with UTI and a type of catheter routinely used in clinical practice were employed.\(^{69–71}\)
- The artificial urine and organic load that were applied to the catheters and the contact time with UT-Polihexanide was similar to that of the device in clinical use.\(^{70,71}\)

In further laboratory tests the superiority of UT-Polihexanide vs, standard treatment and Uro-Tainer® NaCl has been demonstrated in a range of six catheter types used in everyday clinical practice.\(^{73}\) These results demonstrate the effectiveness of UT-Polihexanide for bacterial decolonisation independent of the type of catheter used.\(^{73}\)

The in vivo biological safety of UT-Polihexanide has been demonstrated in a clinically relevant animal model under physiological conditions.\(^{74}\)
Clinical evidence

A study focusing on the tolerance of UT-Polihexanide in patients with indwelling catheters is currently underway. The interim results of this study have resulted in B Braun being granted a CE mark and given the go-ahead from the European regulatory authorities to launch UT-Polihexanide for catheter maintenance. The full results of this clinical study are expected in 2015.

Dosage

The regimen to be used will vary from user to user. However, the tolerability of UT-Polihexanide is such that it can be used for up to two irrigations per day if required.

Safety

Polyhexanide can cause allergic reactions such as itching (urticaria) and rashes (exanthema). In rare cases (less than 1 out of 10,000), anaphylactic shock has been reported. Uro-Tainer® Polihexanide should not be used:

- In cases of hypersensitivity (allergy) to polyhexanide, chlorhexidine, or excipient of the solution
- In case of cystitis or other uro-genital condition that can produce haematuria (blood in the urine). Refer to a doctor who will decide on the treatment
- Uro-Tainer® Polihexanide should not be used for several days after surgery on the bladder or the urinary tract
- Avoid contact with open wounds, the inner and middle ear, the central nervous system, eyes, hyaline cartilage and meninges

Further information about the safe use of Uro-Tainer® Polihexanide, Uro-Tainer® Suby G, Uro-Tainer® Solutio R and Uro-Tainer® NaCl is contained in appendix I-III.
Appendix I

Instructions for use Uro-Tainer® Polihexanide 100 ml

The Uro-Tainer® Polihexanide sachet is supplied sterile and should not be removed from its overwrapping until required for use. If desired, bring solution to body temperature by immersing the wrapped sachet in warm water.

- If the liquid exits from the urethra during the irrigation, the catheter may no longer be in the bladder and the patient may require a new catheter
- If the liquid does not flow, the catheter may be kinked in the bladder or it may be blocked and may require changing
- Apply by gravity feed and avoid force
- Apply using aseptic technique

Contraindications:
Do not use Uro-Tainer® in cases of hypersensitivity to any of the ingredients of the solution; in case of cystitis or any other uro-genital condition that can produce haematuria (blood in the urine); for several days after surgery on the bladder or urinary tract.

Step 1
Tear open overwrapping and remove Uro-Tainer® sachet.

Step 2
Close Uro-Tainer® tube with plastic clamp.

Step 3
Remove tamper proof seal.

Step 4
Twist and withdraw cap without touching sterile connector.

Step 5
Insert connector into the catheter funnel.

Step 6
Holding the Uro-Tainer® above the level of the bladder, release the clamp to allow the fluid to drain in by gravity.

Step 7
When the fluid has stopped draining in (this takes a few minutes), lower the Uro-Tainer® below the level of the bladder to drain fluid back into the bag.

Step 8
Clamp tube and remove the connector from the catheter by turning gently. Connect the catheter to a sterile drainage bag. Dispose of Uro-Tainer® sachet and wash hands.

Do not re-use for single use only. Discard properly after use.
Appendix II
Instructions for use Uro-Tainer® Twin

The Uro-Tainer® Twin sachet is supplied sterile and should not be removed from its overwrap until ready to use. The solution should be at body temperature, approximately 37 degrees. If the solution requires warming prior to use immerse the wrapped sachet into lukewarm water.

Step 1

Peel open the plastic overwrap and remove the Uro-Tainer® Twin.

Step 2

Close both tubes with the green and white clamps.

Step 3

Remove the tear away closure ring.

Step 4

Twist and withdraw cap without touching sterile connector. Release the white clamp into the open position and allow a few drops of the solution to flow into the catheter to remove any air locks.

Step 5

Insert connector into the catheter.

Step 6

Holding Uro-Tainer Twin above the level of the bladder, allow the solution from the 1st chamber to flow into the bladder. To avoid any potential trauma to the bladder do not use force or agitation.

Step 7

Close tube with white clamp.

Step 8

After 5 minutes release white clamp and hold bag below the level of the bladder, and drain the solution. Close tube with white clamp.

Step 9

Now repeat the process using the 2nd chamber of solution. Hold Uro-Tainer® Twin above the level of the bladder and release the green clamp. Allow the solution to flow into the bladder. Again, do not use force or agitation.

Step 10

Close both tubes with the green and white clamps.

Step 11

After 5 minutes release green clamp and hold bag below the level of the bladder, and drain the solution. Close tube with green clamp. Ensure both clamps are now closed.

Step 12

Remove the connector from the catheter by turning gently. Now connect the catheter to a sterile drainage bag. Discard after treatment.

Step 13

For single use only.
Appendix III  Uro-Tainer® Solutions

Catheter Maintenance

B. Braun Uro-Tainer® Twin Suby G

Indication: A mildly hypotonic fluid that is less irritating as a result of the addition of magnesium. This fluid is specially designed to prevent phosphate crystallization and dissolve existing calcification in indwelling catheters.

Recommend rinse frequency: 2 to 3 times per week depending on the scope of the problem, unless prescribed differently by the doctor. The fluid must remain in the bladder for 2 x 5 minutes.

Composition: Per 100 ml: citric acid monohydrate 3.23 g, mild magnesium oxide, 0.38 g, sodium bicarbonate 0.7 g, edetate disodium 2H2O 0.01 g in water for injection. pH = 4.2

<table>
<thead>
<tr>
<th>Size</th>
<th>Catalogue Number</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 ml</td>
<td>FB99851</td>
<td>10</td>
</tr>
<tr>
<td>100 ml</td>
<td>FB99839</td>
<td>10</td>
</tr>
<tr>
<td>60 ml (Twin)</td>
<td>9746609</td>
<td>10</td>
</tr>
</tbody>
</table>

B. Braun Uro-Tainer® Twin Solutio R

Indication: A mild hypotonic fluid that is specially designed for catheters with stubborn calcification where Suby G does not provide a sufficient result. This is due to its higher concentration of citric acid. In addition, this fluid minimises trauma when removing an indwelling catheter.

Recommend rinse frequency: 2 to 3 times per week depending on the scope of the problem, unless prescribed differently by the doctor. The fluid must remain in the bladder for 2 x 5 minutes.

Composition: Per 100 ml: citric acid monohydrate 6.0 g, gluconolactone 0.6 g, mild magnesium carbonate 2.8 g, edetate disodium 2H2O 0.01 g in water for injection. pH = 4

<table>
<thead>
<tr>
<th>Size</th>
<th>Catalogue Number</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 ml</td>
<td>FB99843</td>
<td>10</td>
</tr>
<tr>
<td>100 ml</td>
<td>FB99841</td>
<td>10</td>
</tr>
<tr>
<td>60 ml (Twin)</td>
<td>9746625</td>
<td>10</td>
</tr>
</tbody>
</table>
Appendix III  

**Uro-Tainer® Solutions**

### Mechanical rinsing

#### B. Braun Uro-Tainer® Polihexanide

**Indication:** Uro-Tainer® Polihexanide 0.02 % is used for routine decolonisation (removal of bacteria) of the catheter.

**Recommend rinse frequency:** The regimen to be used will vary from user to user. However, the tolerability of UT-Polihexanide is such that it can be used for up to two irrigations per day if required.

**Composition:** Per 100 ml: polyhexamethylene biguanide (polyhexanide) 0.02 g, sorbitol in water for injections 5.0 g.

<table>
<thead>
<tr>
<th>Size</th>
<th>Catalogue Number</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ml</td>
<td>FB99965</td>
<td>10</td>
</tr>
</tbody>
</table>

#### B. Braun Uro-Tainer® NaCl 0.9%

**Indication:** This isotonic fluid is used primarily for cleaning the bladder and catheters mechanically, e.g. in the case of debris formation in the bladder.

**Recommend rinse frequency:** 1 to 2 times per day depending on the scope of the problem, unless prescribed differently by the doctor.

**Composition:** Sodium chloride 0.9 %. pH=7

<table>
<thead>
<tr>
<th>Size</th>
<th>Catalogue Number</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 ml</td>
<td>FB99849</td>
<td>10</td>
</tr>
<tr>
<td>100 ml</td>
<td>FB99833</td>
<td>10</td>
</tr>
</tbody>
</table>

### Bladder instillations

#### B. Braun Uro-Tainer® M NaCl 0.9% with injection port

**Indication:** The Uro-Tainer® M has an injection port that is specifically for administering drugs.

**Dose:** Depends on the doctor's prescription.

**Composition:** Sodium chloride 0.9 %. pH = 7

<table>
<thead>
<tr>
<th>Size</th>
<th>Catalogue Number</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 ml + injection port</td>
<td>FB99854</td>
<td>10</td>
</tr>
<tr>
<td>100 ml + injection port</td>
<td>FB99853</td>
<td>10</td>
</tr>
</tbody>
</table>
References

13. Wilde MH. Adults experienced a long term indwelling catheter as living with the forces of flowing water. Evid Based Nurs 2002; 5: 125.