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Controlling urinary tract infections associated with intermittent bladder catheterization in geriatric hospitals

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SUMMARY

Background: Controlling urinary tract infections (UTIs) associated with intermittent catheterization in geriatric patients.

Aim: After a local epidemiological study identified high rates of UTI, a multi-disciplinary working group implemented and evaluated corrective measures.

Methods: In 2009, a one-month prospective study measured the incidence of UTI, controlled for risk factors and exposure, in six geriatric hospitals. In 2010, a self-administered questionnaire on practices was administered to physicians and nurses working in these geriatric units. In 2011, the working group developed a multi-modal programme to: improve understanding of micturition, measurement of bladder volume and indications for catheter drainage; limit available medical devices; and improve prescription and traceability procedures. Detailed training was provided to all personnel on all sites. The epidemiological study was repeated in 2012 to assess the impact of the programme.

Findings: Over 1500 patients were included in the 2009 study. The incidence of acquired infection was 4.8%. The infection rate was higher in patients with intermittent catheters than in patients with indwelling catheters (29.7 vs 9.9 UTI per 100 patients, $P = 0.1013$) which contradicts the literature. In 2010, the 269 responses to the questionnaire showed that staff did not consider catheterization to place patients at risk of infection, staff had poor knowledge of the recommended indications and techniques, and the equipment varied widely between units. Following implementation of the programme, the study was repeated in 2012 with over 1500 patients. The frequency of UTI in patients with intermittent catheters fell to rates in the published literature.

Conclusion: Multi-modal programmes are an effective means to control UTI.

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Introduction

The 'Geriatric Interclin' group was created to better coordinate the prevention of infections in six geriatric hospitals of the 'Hospices Civils de Lyon'.

Prior epidemiological studies, conducted in other geriatric facilities, have shown that urinary tract infections (UTIs) are the most common nosocomial infections.^{1–4} In the absence of local data on patient characteristics and the frequency of exposure to at-risk care, it was impossible to identify priorities in terms of prevention, or to assess the effectiveness of past campaigns concerning indwelling catheters.

In 2009, the Geriatric Interclin group conducted an epidemiological study measuring the incidence of UTI, controlled for well-established risk factors^{5,6} and at-risk exposures.⁷ The main result of the study was an abnormally high level of nosocomial UTI associated with intermittent bladder catheterization. The level of UTI associated with indwelling catheters was similar to the published literature. A multi-disciplinary working group [Urinary Tract Infection Control Group (UTIC Group)] was created to define prevention priorities and to improve control actions, with the ultimate goal of reducing the rate of UTI. The UTIC Group consisted of an infection control team (physician and nurses), a clinical team (physicians and nurses), urodynamics experts, a pharmacist and a quality specialist.

The UTIC Group conducted practice evaluations and an extensive educational campaign, and repeated the epidemiological study in 2012 in order to verify the effectiveness of the programme. An overview of the entire programme is presented in Figure 1.

Population and methods

Population

Geriatric units at six geographical locations were included in this study. These consisted of three geriatric hospitals with acute care, subacute care/rehabilitation and long-stay units; and three geriatric units in general hospitals. The total number of beds was approximately 1200.

Epidemiological studies

Similar studies were conducted at the beginning and end of the programme (2009 and 2012). This was a prospective cohort study, and all the geriatric units in the six hospitals participated. In 2009, all hospitalized patients, regardless of whether or not they were suffering from an infection, present in or admitted to a participating unit from 1st June 2009 to 28th June 2009 were included. They were followed until discharge or until 30th June 2009. In 2012, the corresponding dates were from 1st June 2012 to 28th June 2012, and until discharge or until 30th June 2012, respectively.

The study focused on clinical UTI, excluding asymptomatic bacteriuria. The case definition of UTI used was that proposed by the Ministry of Health in 2007 (http://www.sante-sports.gouv.fr/IMG/pdf/rapport_vcourte.pdf), adapted from the definition of the US Centers for Disease Control and Prevention,⁸ and described in the guidelines as follows:

- at least one of the following signs: fever (>38°C) or chills, urgency, urinary or suprapubic pain, burning urination, incontinence or recent increase of dysuria or urinary frequency, worsening of dependency or mental condition, purulent urine in the absence of other causes; and
- positive leukocyturia ($\geq 10^4$ leukocytes/mL) and urine culture ($\geq 10^3$ micro-organisms/mL without urinary catheterization and $\geq 10^5$ micro-organisms/mL with urinary catheterization) with no more than two micro-organisms.

UTIs were considered to be nosocomial if they developed at least 48 h after hospitalization for external patients, and regardless of the time frame for patients transferred during the study from another geriatric unit taking part in the study.

The endpoints were nosocomial UTI, cumulative incidence rate per 100 patients followed during the study period, and incidence rate per 1000 patient-days attended during the study period.

The data collected on exposure were defined based on the literature:^{7,9,10} type of stay (short and medium stay vs long stay) and dates, type of urinary catheterization (indwelling, intermittent or suprapubic) and dates, presence of nephrostomy, and use of condoms and nappies. Intermittent catheterization was only taken into account if it was used before the onset of infection (occasional catheterization for microbiological testing was excluded).

The data collected on risk factors were: level of functional dependency measured with a simplified activities of daily living (ADL) score¹¹ (from 0 for independent patients to 6 for fully dependent patients), dementia, diabetes (treated with insulin/hypoglycaemic drugs or stabilized using hygienic dietary measures), urinary incontinence, urinary retention, bladder dysfunction, post-voiding residual >300 mL, UTI antecedents (last six months) and immunodeficiency (leukopenia, cancer or immunosuppressive treatment). All the available risk factors established in the literature were included.^{12–14} The data collected in the case of a UTI were: date; micro-organisms identified and antibiotic sensitivity; treatment approval or adjustment according to antibiotic sensitivity; and antibiotics prescribed (initial and adjusted treatments with type of antibiotic and duration).

The study was advertised on posters in the different geriatric units, according to the rules of good practice, and was presented at unit meetings. In compliance with French regulations, this type of non-interventional study does not require ethical committee approval if the data are anonymous and if the hospital has been registered previously by a specific research committee.

For each patient included, a form was completed by the practitioners and nurses, both on admission and during their stay. The forms were collected in each unit in a book that included the guidelines. Compliance was verified by the infection control team.

Data capture and analysis were undertaken by the infection control team using EpiInfo Version 3.1 (Centers for Disease Control and Prevention, Atlanta, GA, USA) and Statistical Package for the Social Sciences Version 17 (IBM Corp., Armonk, NY, USA). Univariate analyses of UTI were performed to compare the risk factors of patients and exposure. The following tests were used for comparisons: Mantel-Haenszel χ^2 test for discontinuous variables (or Yates modified χ^2 for small numbers), Z-test for incidence, and analysis of variance for

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