



DIPARTIMENTO DI BIOLOGIA

Sezione di Anatomia Comparata
Università di Ferrara

REDUCING NOSOCOMIAL INFECTIONS AND HOSPITAL COSTS BY USING A SPECIALLY DESIGNED CATHETER PROCEDURAL TRAY.

Prof. Germano Salvatorelli, Cattedra di Citologia ed Istologia, Ferrara, Italy; **Prof. Gianfranco Finzi**, Direzione Ospedaliera Policlinico S. Orsola Malpighi, Bologna, Italy; **Maddalena Ruggeri**, Caposala Reparto Urologia 2 Policlinico S. Orsola Malpighi, Bologna, Italy; **Prof. Alberto Reggiani**, già Direttore Reparto Urologia 2 Policlinico S. Orsola Malpighi, Bologna, Italy.

ABSTRACT

Background

Most nosocomial infections result from urinary catheterization (Wong, et al). This study examines: a) the extent to which the use of a sterilized catheter procedural tray reduces urinary tract infections and antibiotics' administration (thereby preventing antibiotic breeding); b) cost analysis comparison of traditional catheterization with that of sterilized procedural trays.

Method

Experienced urology nursing staff performed catheterization to patients at a urology outpatient clinic, obtained a urine culture, and refrained completely from antibiotic administration to these patients during the test period.

Results

Without the use of antibiotics, only 13.5% had a positive urine culture, compared to 66–88% of infections following instrumentation of the urinary tract in other researches.

The cost of procedure using the catheter procedural tray was 28% less expensive than other common procedures, not including the saving on antibiotics that would have increased this margin.

Conclusions

The use of the Catheter Procedural Tray (Kit):

- Rationalizes preparation of the materials.
- Does not incur any significant incidence of infection/pain symptoms vs. the total number of patients catheterized.
- Saves the need for administration of antibiotics, thereby preventing Antibiotic Resistant Bacteria.
- Saves the cost of antibiotics and cost of dealing with Antibiotic Resistant Bacteria.
- Only one nurse/unit is required to catheterize the patient with the Procedural Tray.
- Saves about 28% on procedure costs. (Not including the saving on antibiotics).
- Makes it easier to dispose of wastes.



DIPARTIMENTO DI BIOLOGIA

Sezione di Anatomia Comparata
Università di Ferrara

REDUCING NOSOCOMIAL INFECTIONS AND HOSPITAL COSTS BY USING A SPECIALLY DESIGNED CATHETER PROCEDURAL TRAY.

Prof. Germano Salvatorelli, Cattedra di Citologia ed Istologia, Ferrara, Italy; **Prof. Gianfranco Finzi**, Direzione Ospedaliera Policlinico S. Orsola Malpighi, Bologna, Italy; **Maddalena Ruggeri**, Caposala Reparto Urologia 2 Policlinico S. Orsola Malpighi, Bologna, Italy; **Prof. Alberto Reggiani**, già Direttore Reparto Urologia 2 Policlinico S. Orsola Malpighi, Bologna, Italy.

INTRODUCTION

"The urinary tract is the most common site of nosocomial infection, accounting for more than 40% of the total number reported by acute-care hospitals. Most of these infections--66%-86%-- follow instrumentation of the urinary tract, mainly urinary catheterization" - Guideline for Prevention of Catheter-associated Urinary Tract Infections. *Written by Edward S. Wong, M.D. in consultation with Thomas M. Hooton, M.D.*

The procedure of inserting catheters in the urinary tract is a standardized routine practice, performed with sterile procedural kits, assembled either by the hospital itself or acquired from kit makers. In spite of using such sterilized kits, the incidence of urinary tract infection is still highly prevalent and administration of preventive antibiotics has become common practice with patients who need catheterization. It is therefore in the interest of hospitals that specialised kits claiming elimination of such risk and its implications are tested for consideration of future use.

Financial constraints force hospitals worldwide to seek and/or adopt cost-saving materials/procedures. With medical care, low price alone must of course not be the sole determinant in buying or implementing materials or procedures. Cost-effectiveness **has** to take into account broader, and often longer term, factors. It may be argued that it is not simply an issue of 'balancing the books', but of balancing Cost-Saving benefits with Life-saving-benefits. In an ideal world, a product would satisfy **both** these criteria. The purpose of this research is to demonstrate that within the field of urology, such potential is not only possible, but already exists.

In order to avoid acute urinary tract infections and/or painful symptoms in patients catheterized with sterilized pre-packed catheter procedure trays, we decided to test the Specialized Catheter Procedural Tray (Kit), manufactured by EUROBAND (Pollak International LTD. – Israel). The efficacy of this Catheter Procedural Tray was tested by monitoring patients who had undergone their first catheterization, as well as patients who periodically have their catheters changed at the Urology Outpatient Clinic of the Department of Urology, S. Orsola-Malpighi University Hospital in Bologna, Italy.

This study should provide evidence on the lack of infection encountered with the Specialized Catheter Procedural Tray. It produces the benefits of the procedure while renouncing to the routine

administration of antibiotics for prevention of the respective infections frequently occurring during the traditional procedure.

OBJECTIVE

- To demonstrate that using the Sterilized Catheter Procedural Tray to introduce a catheter into the bladder leads to statistically significant decrease in cases of urinary tract infections by searching for evidence of the above.
- To verify that using the Sterilized Catheter Procedural Tray prevents infection and thereby saves the need for administration of antibiotics, which has negative implications, such as breeding of antibiotics resistant bacteria and cost.
- To perform an analysis of the costs for the materials and personnel, comparing the traditional form of catheterization with that performed using the Sterilized Catheter Procedural Tray.

MATERIALS AND METHODS

- Procurement of sterile catheterization kits packaged according to an assembly procedure agreed upon with the manufacturer.
- The study was performed during the months of March, April, May and June 2005 and involved 52 patients referred to the Urology Outpatient Clinic, of which 2 were women.
- All patients were treated in a urological surgery.
- The catheterization was performed by experienced urology nursing staff.
- A urine culture was performed only after catheterization.
- No antibiotics were administered to those patients during the test period.

MATERIALS CONTAINED IN THE KIT

Below is a list of the individual components:

1 ETO sterilized rigid transparent PVC tray (later to be used as receptacle for fluids) with peel-open Tyvek[®] cover. Tyvek[®], unlike paper, is not as susceptible to splits, tears, or punctures and hence is safer for maintaining the sterility of the contents (paper covers can be easily punctured, even by mild pressure from a relatively light object, such as the corner on another tray, or slight pencil pressure, etc.).

Components (in order of Removal from the Kit/Use):

1 pair of EVA gloves

1 poly-backed towel (plastic surface outside, absorbent surface inside)

1 fenestrated towel (plastic surface outside, absorbent surface inside)

1 Pair of Powder Free Latex Gloves, size Medium

1 waste disposal bag: with adhesive flap for attaching to work surface

1 sachet containing 3 X Povidone-Iodine USP 10% (PVP) Antiseptic Swabsticks manufactured by: APLICARE, Inc Branford, CT. U.S.A

2 Gauze pads (Swabs), 10 x 10 cm, 8 ply

1 Gauze Tupper (gauze ball 22 mm)

1 peel open sachet of PEDICAT™ - Water Soluble Antiseptic Lubricating Gel: This sachet can be opened in two ways. It can be:

- a) peeled apart at top edge so that the catheter tip can then be inserted into the sachet for lubrication
- b) torn open at bottom corner, to enable the gel to be squeezed out onto/into the organ for lubrication.

1 FLOWCLAMP™ - Disposable haemostat 11.25 cm (4½") for occluding tubes

1 10 ml syringe, pre-filled with 10 ml of fluid; 90% water, 10% glycerin. Distilled, purified water, free of any salts or additives is used in the syringe to prevent damage to the latex balloon. 10% Glycerin is added to the water to improve the performance of the latex.

The entire syringe and its contents undergo Gamma Ray sterilization in a validated system that is compatible with the syringe and its contents and does not allow penetration of the ETO used during sterilization of the tray.

PROCEDURE

- 1) The attendant/assistant dons the EVA gloves and wears them while preparing the patient for the procedure.
- 2) The Poly-backed Towel is spread open with plastic surface downwards, absorbent side facing upwards and is used as a sterile field. The contents of the open tray are then spilled onto this sterile field. The empty tray is set aside to be used later.
- 3) The red strip is torn off the adhesive flap of the waste disposal bag and the adhesive flap is then used to attach the waste disposal bag to edge of work surface, with top edges open to receive items as they are used and discarded.
- 4) The Fenestrated Towel is spread open, plastic surface down, over the patient's skin and draped over the area to be treated.
- 5) The attendant takes off the EVA gloves and dons the Latex Gloves to be worn throughout the procedure.
- 6) PVP Swabsticks are used to disinfect the treated area as indicated below.
Males: Using a gauze pad, grip the penis and thoroughly disinfect the glans using the swab sticks, working in circular movements from the tip downwards.
Females: Using a gauze pad, open the labia and thoroughly disinfect the vestibule walls using 3 swab sticks: one for each side and the third for the urethral orifice.
- 7) Use the Pedicat lubricating as described above.
- 8) Turn the Flowclamp to seal off the opposite end of the catheter.
- 9) Grip the organ with the second gauze swab and insert the catheter.
- 10) Place the PVC tray (set aside at point 2 above) at the end of the Catheter, turn the Flowclamp slightly to permit urine to flow into the tray for urine examination, tighten the Flowclamp again and examine the urine.
- 11) If the urine is O.K. without blood clots etc. connect the catheter to the urine bag and remove the Flowclamp.
- 12) To inflate the balloon, connect the 10 ml syringe to the inflating section of the catheter inflating about 8 ml, make certain that the catheter is fully secured, if not add the remain 2ml..
- 13) Use the Tupfer to absorb any fluids.

14) Throw all components used and their packaging into the open waste disposal bag, seal the bag with the adhesive flap and dispose of the bag.

RESULTS

- It was found that the urine culture was positive only for those patients having symptoms due to urinary tract infection.
- The seven patients with positive urine culture presented the following symptoms: 5 showed signs of hematuria and 2 complained of a burning sensation.
- There does not appear to be any correlation between the first symptoms and first catheterization, or catheter replacements.
- Five patients did not show up for the subsequent control and thus were lost to the study.

STUDY OF CATHETERIZATION WITH THE KIT MARCH-APRIL-MAY-JUNE 2005

NAME	PERM. CATH.	CATH. FOR RET.	SYMPTOMS	POS. URINE CULTURE	NEG. URINE CULTURE
E.E.	YES		NO		YES
V.U.	YES		NO		YES
P.C.		YES	NO		YES
M.C.	YES		NO		YES
B.L.		YES	NO		YES
Z.A.	YES		HEMATURIA	YES	
T.L.	YES		NO		YES
G.M.		YES	NO		YES
P.C.		YES	NO		YES
P.A.	YES		NO		YES
R.G.	YES		NO		YES
D.S.R.		YES	NO		YES
F.L.		YES	BURNING	YES	
L.G.	YES		NO		YES
P.W.		YES	NO		YES
C.A.	YES		NO		YES
F.P.	YES		NO		YES
C.F.		YES	HEMATURIA	YES	
L.W.	YES		NO		YES
G.N.F.	YES		NO		YES
R.E.	YES		NO		YES
R.A.M.		YES	NO		YES
F.L.	YES		NO		YES

NAME	PERM. CATH.	CATH. FOR RET.	SYMPTOMS	POS. URINE CULTURE	NEG. URINE CULTURE
S.G.		YES	HEMATURIA	YES	
V.G.		YES	NO		YES
N.E.	YES		NO		YES
F.G.	YES		NO		YES
T.R.		YES	HEMATURIA	YES	
G.O.	YES		NO		YES
A.G.	YES		NO		YES
T.L.		YES	BURNING	YES	
F.M.G. (woman)	YES		NO		YES
Z.N.	YES		NO		YES
DM.G.	YES		NO		YES
C.M.	YES		NO		YES
E.E.	YES		NO		YES
V.U.	YES		NO		YES
T.L.	YES		NO		YES
L.W.	YES		NO		YES
G.N.F.	YES		NO		YES
R.E.	YES		NO		YES
G.V. (woman)	YES		NO		YES
G.A.		YES	HEMATURIA	YES	
M.I.		YES	NO		YES
D.A.	YES		NO		YES
R.E.	YES		NO		YES
R.A.M.		YES	NO		YES
V.T.		YES			LOST TO STUDY
F.L.	YES				LOST TO STUDY
S.T.	YES				LOST TO STUDY
G.L.		YES			LOST TO STUDY
Q.S.	YES				LOST TO STUDY

Legend:

Symptoms = burning/fever/post-catheterization hematuria

Perm. cath. = bearer of permanent catheter

Retent. = initial positioning

Pos./Neg. urine culture = after introduction of the catheter and/or first replacement or removal

COST ANALYSIS

Study performed with costs as of May 2006

COST ANALYSIS OF MATERIALS NEEDED FOR TRADITIONAL CATHETERIZATION VS. CATHETERIZATION KIT/URINE BAG		
MATERIALS & COSTS NEEDED FOR TRADITIONAL CATHETERIZATION		
NAME	UNIT COST (in €)*	TOTAL COST (in €)*
Closed circ. urine bag 2.5 l	1.79	1.79
2-way Foley silicone-coated probe	2.13	2.13
Sterile syringe with needle 10 ml **	0.08	0.08
Sterile, powder-free surgical gloves	0.47	0.47
KY lubricant (pouch)	0.41	0.41
Physiological solution 10 ml **	0.10	0.10
Disposable gloves	0.06	0.06
Sterile TNT compress (5 piece pouch)	0.02	0.10
Esojod disinfectant 30 ml	0.36	0.36
Sterile disposable fenestrated towel 50x75	0.81	0.81
Sterile towel to cover instrument table 75x90	0.58	0.58
Sterile kidney dish reusable (Proportion cost)	0.18	0.18
Sterile klemmer clamp ***		
Flat pouch 100x300	0.09	0.09
Indicator of 134°C steam sterilization	0.06	0.06
Sterilization cycle	0.41	0.41
Nursing time x 1 unit/2 units; 10' - 15'	0.80	10.00
TOTAL		17.63

MATERIAL & COSTS REQUIRED FOR CATHETERIZATION WITH PROCEDURAL TRAY		
Catheterization KIT without bag	3.50	3.50
2-way Foley silicone-coated probe	2.13	2.13
Closed circ. urine bag 2.5 lt	1.79	1.79
Nursing time x 1 unit; 7' - 10'	0.80	5.28
TOTAL		12.70

* Antibiotics are routinely administered in traditional catheterization for the prevention of infection. As antibiotics are not practically required when there is no infection, it is not required in the procedure if performed with the Catheter Procedure Tray, the cost of the

antibiotic itself and the cost of its administration were excluded from the cost analysis, but should be considered as part of the final decision.

** Sterile syringe with 10 ml needle and Physiological Solution containing 0.9% NaCl will harm the inflated balloon container in the catheter, causing it to burst after a short time in the bladder.

*** Klemmer clamp is not included in the traditional catheterization procedure. The clamp permits examination of the first urine flowing into the tray. The clamp also assists the insertion of the catheter.

CONCLUSIONS

The use of the Catheter Procedural Tray (Kit):

- Rationalizes preparation of the materials: kit components are arranged according to procedure sequence use, so that the attendant nurse need not waste time and/or unnecessarily touch other tray components required for later stages of procedure. Similarly, not having to search elsewhere for components prevents the attendant's own contamination, thus not contaminating the patient, as well as avoiding contamination of other hospital areas.
- According to test results' analysis, use of the kit does not incur any significant incidence of infection/pain symptoms vs. the total number of patients catheterized.
- According to test results' analysis, the kit saves the need for administration of antibiotics, thereby preventing Antibiotic Resistant Bacteria (in some hospitals, traditional catheterization procedures include routine administration of antibiotics – even **before** any symptoms are present)
- As direct result of the few contamination incidents, it saves the cost of antibiotics and cost of dealing with Antibiotic Resistant Bacteria.
- Traditional catheterization procedure requires assistance to the attendant nurse, whereas only one nurse/unit is required to catheterize the patient with the Procedural Tray.
- According to the cost comparison, it saves about 28% on procedure costs. This does **not** include savings made from not having to administer antibiotics. Adding these factors to the comparison would substantially increase the cost difference in favor of the Procedural Tray.
- Makes it easier to dispose of wastes: the adhering waste bag is included in the tray for aseptic disposal of the used components.