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Does evening removal of urinary catheters shorten hospital stay amongst general hospital patients? A randomized controlled trial

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ABSTRACT

Objective: Literature indicates that removing urinary catheters at midnight facilitates earlier discharge amongst urology patients but the effect of evening removal on general patients is unknown. The objective of the present study was to investigate whether removing a urinary catheter at 22.00 hours compared to 06.00 hours amongst a general hospital population would lead to earlier hospital discharge.

Design: A randomized controlled trial.

Setting and Subjects: The study was conducted in a large tertiary hospital in Brisbane, Australia. Two hundred and ten general surgical and medical patients who had an indwelling catheter as part of their routine care were included.

Results: Length of hospital stay following catheter removal was not significantly affected by the timing of its removal among general hospital patients: mean hours morning 186.1; mean evening 209.3, ($p = 0.309$). In a cohort of surgical patients, the hospital stay was shorter in the evening removal group (mean hours morning 186.1; mean evening 209.3) but this result was not statistical significant ($p = 0.127$). Patients in the evening group were more likely to have a longer time period between catheter removal and the first post-catheter void, mean hours morning, 3.76 v evening. 4.89 ($t = -2.59$, confidence interval –1.99 to –0.27). Timing of removal of the urinary catheter had no effect on the volume of the first void, mean volume morning, 214.7 mls v evening, 221.4 mls. Twenty five (12.1%) patients were re-catheterized but the rate of recatheterisation between groups was simliar. There were no differences in post discharge problems between groups.

Conclusion: Amongst general hospital patients, removing an indwelling urinary catheter at 22:00 hours does not shorten the length of stay but is effective in increasing the time to first void.

INTRODUCTION

New practices or procedures are frequently adopted by clinicians before a convincing body of evidence of effect has been established[1]. For example, staff from several wards in our hospital were contemplating changing from the ritual of removing urinary catheters at 06:00 hours, to late evening removal because they had heard that doing so may reduce length of hospital stay. A question about the accuracy of this information was brought to our Evidence Based Practice Group[2] for consideration and review before any change was made. Such reviews are valuable for identifying evidence gaps and to provide clinically relevant questions for our research agenda.

LITERATURE REVIEW

Since the late 1980s, timing of indwelling urinary catheter removal has been the subject of several studies, comparing midnight catheter removal with the traditional 06:00 hour removal[3-7]. These studies have been prompted by problems associated with 06:00 hour removal including diagnosing voiding difficulties late in the day when limited medical staff are available to make treatment decisions, a tendency of nursing staff to be busy with other duties at that time of day and performance anxiety patients may feel, with a focus on voiding, during the period following catheter removal[4].

Outcomes of interest from previous studies have included incidence of recatheterisation/failed trial of void[3,5,6], amount of the first post-catheter void[4-7], the mean time to the first post-catheter void[4-7], and the interval between urinary catheter removal and hospital discharge[5-8]. Results of these studies indicate that removing a urinary catheter at midnight facilitates earlier discharge but does not affect recatheterization/failed trial of void rates. The effects on volume of first void and length of time to first void are still inconclusive.

Earlier investigations have been limited by a number of factors. Most were based on the assumption that catheters are routinely removed at 06:00 hours. However this is not always the case. Between 20% and 50% of catheters are removed at times other than allocated to coincide with other events such as doctor's rounds or a co-procedure, or in response to a written order; removal may simply be at the convenience of nursing or medical staff[4,9]. In addition, most of the studies to date have included only post-surgery urological patients, the majority of whom were males. Thus, it is difficult to extrapolate the results to a general surgical population, or even to women. Two of the studies reported on recatheterisation[5,6]; but none have followed patients after discharge. Further methodological limitations among the reported studies include no sample size estimates, lack of information about inclusion and exclusion criteria and lack of information about the method used to generate the random allocation schedule. These limitations have led to a call for further trials in wider settings[10].The current study was designed to test if similar results could be demonstrated amongst a heterogeneous population. We also used a 22:00 hour, rather than midnight catheter removal schedule, to fit with local ward routines and patient comfort.

DESIGN

We conducted a prospective, single centre randomized controlled trial of 22:00 hour urinary catheter removal (intervention) compared with 06:00 hour removal (control). We recruited patients requiring an indwelling urinary catheter from eight hospital wards at the Royal Brisbane and Women's Hospital, Brisbane, between February 2001 and March 2003. Patients

were included if they were over 18 years of age and were able to give written informed consent. Those who had a supra-pubic catheter, a permanent indwelling urinary catheter, or who were pregnant or newly diagnosed with gynecological cancer were excluded from the study. Patients who were subsequently re-admitted and were enrolled in the trial on a previous admission were not re-enrolled. The hospital's Human Research Ethics Committee approved our study and we sought written consent from all participants. At baseline we recorded age, gender, previous urinary problems and the reason for admission. The ward or location in which the catheter was inserted and fluid intake in the previous 24 hours was also recorded. A label indicating treatment arm was placed in the patient's notes. We also placed a label on the catheter with either *'Remove at 22:00 hours'* or *'Remove at 06:00 hours'* to limit the likelihood of the catheter being removed at the wrong time. Two weeks after discharge, all patients enrolled in the study were sent a short questionnaire to assess the presence of any urinary problems experienced since leaving hospital. Those who did not respond within two weeks were sent a reminder letter and a duplicate questionnaire.

OUTCOME MEASURE

The primary outcome measure was the length of stay from catheter removal to hospital discharge. Secondary outcome measures were time to first post-catheter void, volume of first post-catheter void, proportion of patients requiring recatheterisation and urinary problems after discharge.

GROUP ASSIGNMENT AND BLINDING

Randomization (ie generation of allocation sequence) was performed using a computer generated table of random numbers supplied by the Hospital's Perinatal Research Centre. Randomization was stratified by ward to ensure that the various specialties (for example gynecology and general surgery) were equally represented in each group. Individuals were allocated to either to 22:00 catheter removal (intervention group) or to 06:00 catheter removal (control group) by phone call to a scientist who was independent of the recruitment process and blind to baseline interview. Neither the clinicians nor the patients were blinded to the intervention. Ward staff, who were aware of group assignment but who were not part of the research team, recorded outcome data. Data were processed and coded by a researcher who was unconnected with treatment but who was not blind to randomization. There were no identified violations in allocation concealment.

STATISTICAL ANALYSIS

The sample size was based on the primary outcome measure of the length of time to discharge following urinary catheter removal. We chose the mean length of stay of hysterectomy patients at the hospital during 2001 to calculate the sample size. This was because, in the planning stages, we anticipated that the highest proportion of participants would be from this group. We estimated that at the 5% alpha level we would require 100 patients in each group to give an 80% power of detecting a 30% decrease in the length of stay from 6.64 days to 4.65 days. The actual mean length of stay in the control group was 7.76 days. The sample size of 100 participants per group therefore gave a 90% power at the 5% level of detecting a 30% decrease (from 7.76 days to 5.43 days) in the length of stay.

SPSS (Version 11.0, SPSS, INC, Chicago, IL) was used for our analysis. Length of stay was calculated from the time of catheter removal to hospital discharge. For all analysis which included 'surgical only' patients, we included patients admitted for bladder related surgery, non-bladder related gynecological surgery, general surgery and orthopedic surgery. We used

standard methods to calculate the relative risk of an outcome in the 22:00 hour group compared with the 06:00 hour group, with a 95% confidence interval. Where appropriate, χ^2 tests of significance were performed and presented as p-values. For continuous variables which were normally distributed we used the independent samples *t* test. For continuous variables, which were not normally distributed, equivalent non-parametric tests were used. Data was analysed on an intention to treat basis.

RESULTS

Recruitment

From a total of 998 patients admitted to participating wards with urinary catheters in situ or having urinary catheter inserted while on the ward, 631 met the eligibility criteria and 210 (33.3%) were recruited into the trial. Figure 1 summarises recruitment, participation and reasons for exclusion. Four patients were excluded after randomisation, all were due to ineligibility. Of the 206 patients commencing the in-patient component of the study, 170 (82.5%) responded to the post-discharge questionnaire.

Characteristics of study participants

Table 1 shows the baseline characteristics of the patients. More women (137) than men (69) were recruited, reflecting the high proportion of gynecological participants who were enrolled. At study entry, 31 (18.6%) participants had a history of incontinence and 18 (11.9%) had a history of UTI. There were no significant differences in baseline characteristics, urinary risk factors or duration of catheterization between the morning and evening groups. Reasons for admission were also similar.

Effect of intervention

Primary outcome

The time of urinary catheter removal was not recorded for six patients (1 in the morning group and 5 in the evening group) leaving 200 patients for the analysis. The mean length of stay from catheter removal to hospital discharge was 198.5 hours (range 1 hour – 2,534 hours). Overall, the length of hospital stay following catheter removal was longer in the evening group but the difference was not statistically significant. (Table 2). However, 4 of the 5 participants who remained in hospital for more than 800 hours were in the evening group. When we re-analyzed the data without these patients the mean length of time between catheter removal and discharge was marginally shorter for the evening group (159.9 hours) compared with the morning group (172.5 hours) but again, the difference was not statistically significant. To test if there were any advantages of evening catheter removal amongst particular groups, we conducted a number of sub-analysis (Table 2). The length of hospital stay from catheter removal to discharge amongst surgical patients was shorter for the evening group but the difference was not statistically significant (morning 141.4 hours, evening 97.6 hours). We also conducted a sub-analysis on patients who were discharged within 48 hours of catheter removal (n = 44) to eliminate those who remained in hospital for reasons unlikely to be associated with bladder function. Length of stay was 23.3 hours in the morning group and 27.8 hours in the evening group, a non-significant result.
On 42 occasions the IDC was removed at the wrong time so we conducted a secondary analysis according to the actual time of catheter removal. Results remained similar (morning 177.7 hours, SD 255.63; evening 221.0 hours, SD 335.99, p = 0.309).

Secondary outcomes

Duration of urinary catheterizartion.

Time of insertion or time of removal of the urinary catheter was missing from 26 records, leaving results from 180 patients for analysis. Males in the morning group had their urinary catheters in for a longer period than those in the evening group (155 hours morning, 103 hours evening) but the difference was not statistically significant. Other sub-groups results are shown in Table 2.

Length of time to first post-catheter void

Data was available for 162 patients. When all participants were considered, the mean time to the first post-catheter void was 4.2 hours. Compared with the morning group, those in the evening group experienced a longer period between catheter removal and voiding ($p = 0.011$). This difference remained constant for surgical patients and for women but men were unaffected by group allocation (Table 2).

Volume of first postcatheter void

Fifty eight patients passed urine for the first time in the bathroom and the volume was not recorded. Table 2 shows that the mean volume of the post catheter void for the remaining 148 patients was 254 mls, there were no statistical differences between groups or sub-groups on this measure.

Fluid intake in the 24 hours before urinary catheter removal

The volume of fluid intake was recorded for 112 patients. Men drank more than women (mean for men 2243 mls, mean for women 1569 mls, $p = 0.01$) during this time but there were no difference between the morning and evening groups or sub-groups (Table 2).

Other inpatient outcomes

A total of 49 (26.9%) patients underwent a bladder scan. Over half of these patients (27) were admitted for bladder or gynecological surgery. There were no significant differences between the morning and evening groups on this measure ($p = 0.32$). Twenty five patients (12.8%) required recatheterization with similar numbers in the morning (14) and evening (11) groups ($p = 0.34$).

Post discharge urinary problems

Of the 170 patients who returned their post discharge questionnaire, 52 (30.6%) reported post discharge urinary problems, the proportion in each group experiencing problems was similar ($p = 0.223$). Of these, 35 (67.3%) sought treatment from their general practitioner or a hospital doctor. When the total population was considered, longer indwelling catheter duration was stongly associated with post-discharge urinary problems (with problems, mean urinary catheter duration 94.05 hours; without problems, mean catheter duration 77.47 hours; $p = 0.000$). Details of specific problems and the treatment received are shown in Table 4.

DISCUSSION

The main aim of the current study was to investigate whether removing a urinary catheter at 22.00 hours compared to 06.00 hours amongst a general hospital population would reduce the time between catheter removal and hospital discharge. We found, on average, patients in the study remained in hospital for 7 ½ days after their urinary catheter was removed, with the length of time to discharge being unrelated to the timing of catheter removal.

Strengths and limitations.

Using an appropriately powered, randomized controlled design strengthened the study findings. The method ensured that any potential for bias was minimized, particularly during group allocation. As a result of the randomization process, participants were well balanced at baseline, increasing confidence in results. We also had a high rate of response to the post discharge survey and this has provided information previously unavailable. We were able to recruit only one third of patients who were potentially eligible to participate. This is not necessarily a limitation, because those included were well matched for important risk factors however, as demographic data was not collected on non-participants, we do not know if the sample was representative of the overall patient population. Our inability to recruit all of those who were potentially eligible was because the research assistant was available for only two days each week. This also prevented close monitoring of outcomes such as the volume and timing of the first void. This information was missing from the records of up to 30% of participants. The widespread inclusion criteria were, in retrospect, a limitation. The study would have been strengthened if we had restricted enrolment to surgical patients only. This would have provided the necessary power to detect any real differences in this group for the primary outcome measure. As it was, for most of the medical and neuroscience patients, length of hospitalization had little to do with catheter removal and contributed to our wide confidence intervals. A further limitation was a lack of generalizability; recruitment was from a single centre.

Comparison with other studies

Our study differs from previous work in a number of ways. For example, we included a heterogeneous sample of general patients, whereas other studies have focused mainly on prostatectomy patients[5-8]. The advantage of doing this was to include patients from the specialty areas where changing to an evening removal policy was being considered. It provided nurses working in such areas with an opportunity to test the existing evidence on a different population **before** making policy changes. We also included patients who did not undergo a ‘formal’ trial of void as a pre-condition of discharge. These differences explain why our results were at odds with other studies and draws attention to the problem of extrapolating results from one population and expecting similar results in an entirely different patient mix.

In line with other studies[5-7] we found the time between the first post-catheter void was longer amongst patients who had catheters removed late in the evening; the difference between the morning and evening group was just over one hour. Whether this is useful or not is speculative. These patients slept on average for four hours before voiding. They may well have had a more restful night than if the catheter had been left in situ. The result did not translate into a greater volume of urine being passed, which may be the more important clinical outcome. However, urine volume was based on results from only 148 patients. Others passed urine without it being measured, so caution is needed in interpreting this result. Never the less, the finding is consistent with other data[5-8] and the proportion of patients from whom we could not obtain a result on this outcome was similar between groups.

Patients in the evening catheter removal group had their catheters in situ for a shorter period of time than the morning group. Given the strong relationship between urinary tract infection and duration of catheterization[11] and a potential for more severe sequelae such as bacteraemia[12], this aspect of catheter removal deserves more attention. Although the rate of post-discharge urinary problems was similar between the morning and evening groups in this cohort, when all participants were considered, there was a strong association between urinary

problems and the duration of catheterization. This reinforces again the importance removing an indwelling urinary catheter as early as possible.

Finally, 20% of catheters in each group were not removed at the allocated time, which is consistent with previous findings[4,9]. This reflects the fact that it was a 'pragmatic' trial, conducted in a 'real world' clinical setting where it is not possible to control all the variables that may affect outcomes. Reasons for deviations from the protocol included ‘medical orders’, ‘patient request’ and ‘ward too busy’. Irrespective of this, neither the intention to treat analysis nor analysis by actual time of catheter removal showed that the timing of catheter removal affected any of the important study outcomes.

Implication for nursing practice

Nurses have a great deal of autonomy in deciding when a urinary catheter should be removed. This study was started because nurses in a number of wards were aware of existing 'evidence' that supported evening removal of urinary catheters to shorten hospital stay and were keen to change their ritualized practice in line with this evidence. However, the current investigation demonstrates that nurses should be wary of implementing changes which are based on study populations which are different from their own. We have shown that the significant advantages associated with late evening catheter removal, described amongst urology patients, could not be replicated amongst a more diverse cohort. Findings suggest that removing a urinary catheter at any time will not affect length of stay. However, removing catheters as soon as practical may reduce the incidence of post-discharge urinary problems.

CONCLUSION AND RECOMMENDATIONS FOR FUTURE RESEARCH.

Our results indicate, amongst general hospital patients, that a urinary catheter may be removed at any time that is organisationally suitable or convenient to the patient, without affecting the time between catheter removal and hospital discharge. The potential for a shorter hospital stay amongst surgical patients when their urinary catheter is removed late in the evening requires further investigation using an adequately powered randomized controlled design. It may also be useful in future studies to investigate patients' and nurses' attitudes and perceptions of evening and morning catheter removal.

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References

1. Greenhalgh T. "Is my practice evidence-based?". *BMJ*. 1996;313:957-8
2. Webster J, Lloyd WC, Pritchard MA, Burridge CA, Plucknett LE, Byrne AJ. Development of evidence-based guidelines in midwifery and gynecology nursing. *Midwifery*. 1999;15(1):2-5.
3. Wyman A. What time of day should a urethral catheter be removed? *J Royal Soc Med.* 1987;80:755.
4. Noble JG, Menzies D, Cox PJ, Edwards L. Midnight removal: an improved approach to removal of catheters. *Br J Urol*. 1990;65(6):615-7.
5. Chillington B. Early removal advances discharge home. Comparison of midnight and early morning catheter removal following prostatectomy. *Prof Nurse.* 1992;8(2):84-9.
6. Crowe H, Clift R, Duggan G, Bolton DM, Costello AJ. Randomised study of the effect of midnight versus 0600 removal of urinary catheters. *Br J Uro.l* 1993;71(3):306-8.
7. McDonald CE, Thompson JM. A comparison of midnight versus early morning removal of urinary catheters after transurethral resection of the prostate. *J Wound Ostomy Continence Nurs.* 1999;26(2):94-7.
8. Kelleher MM. Removal of urinary catheters: midnight vs 0600 hours. *Br J Nurs*. 2002;11(2):84-90.
9. Watt E, Lillibridge J. Time of day urinary catheters are removed: a study of current practices. *Urol Nurs.* 1998;18(1):23-5.

10. Fernandez R, Griffiths R, Murie R. (2003) A comparison of late night and early morning removal of short term urethral catheters. A Systematic Review. JBI Reports 1:1. pp1-16. Blackwell Publishing. http://www.joannabriggs.edu.au
11. Foxman B. Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. *Am J Med.* 2002;113 Suppl 1A:5S-13S.
12. Coello R, Charlett A, Ward V, et al. Device-related sources of bacteraemia in English hospitals-opportunities for the prevention of hospital-acquired bacteraemia. *J Hosp Infect*. 2003;53(1):46-57.

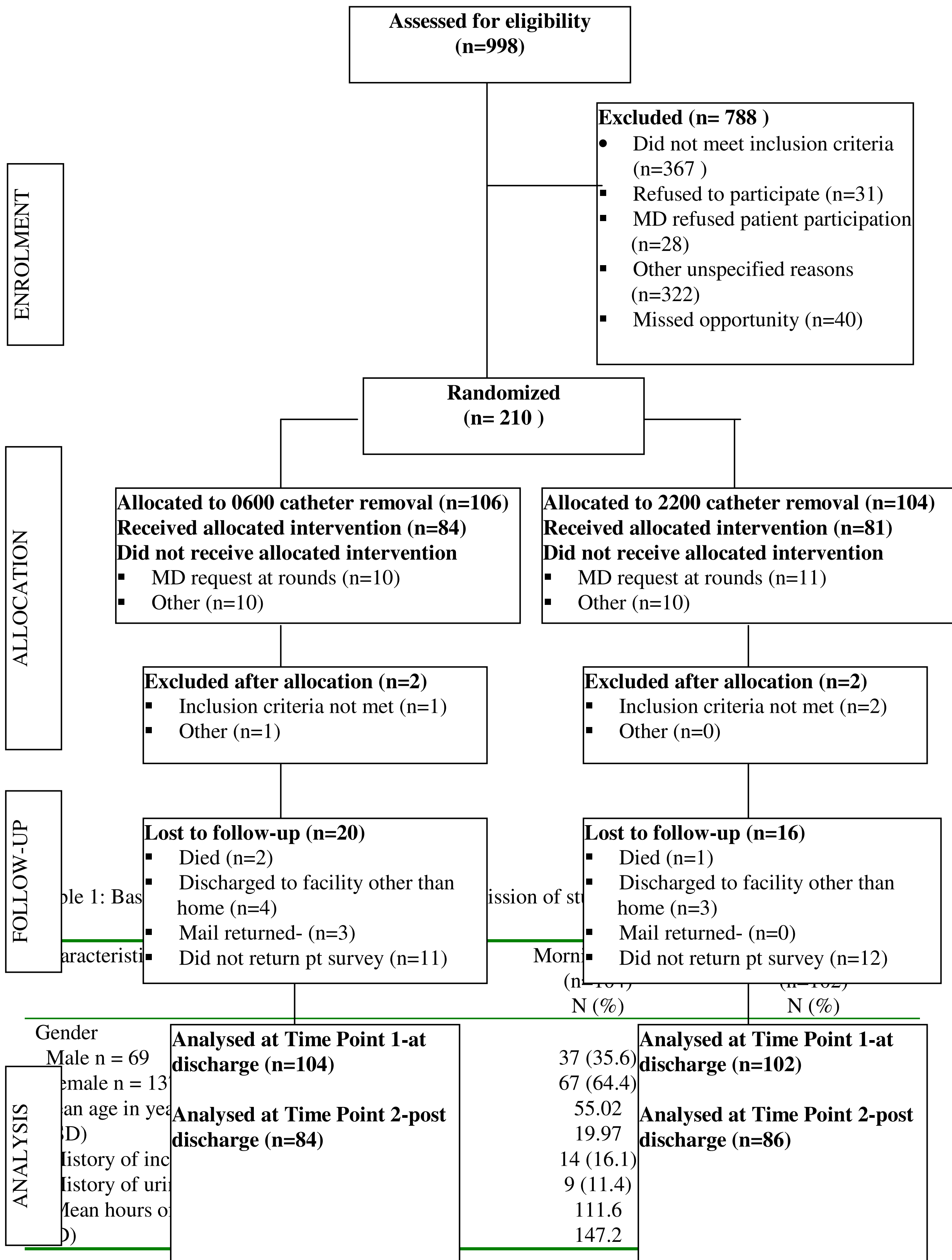

Figure 1: Recruitment and participation

Reason for admission		
Bladder related surgery	3 (2.9)	4 (4.1)
Non-bladder related gynecological surgery	24 (23.1)	23 (23.5)
Cranial insult/spinal injury surgery	8 (7.7)	16 (16.3)
Multitrauma	4 (3.8)	4 (4.1)
General surgery	12 (11.5)	8 (8.2)
Orthopedic surgery	19 (18.3)	21 (21.4)
Medical admission	18 (17.3)	15 (15.3)
Missing	1 (1.0)	4 (3.9)

History of incontinence, urinary tract infection and duration of catheterisation was not recorded for some patients. The number in each group, for these variables, are shown as (morning/evening).

Table 2: Mean (SD) hospital based outcomes for morning and evening groups.

Outcomes (Total No participants in morning/evening group)	Morning group Mean (SD)	Evening group Mean (SD)	*t* test (95% CI for differences)	Sig. (2-tailed)
Time between catheter removal and discharge in hours				
All patients (103/97)	190.9 (261.1)	206.4 (330.3)	-0.37 (- 98.31 to 67.25)	0.712
Discharged < 48 hours of IDC removal (19/25)	23.3 (13.6)	27.8 (11.9)	-1.18 (-12.34 to 3.23)	0.244
Surgical patients (57/54)	141.4 (171.6)	97.6 (109.3)	1.60 (-10.38 to 98.06)	0.112
Females (65/67)	153.0 (173.6)	182.0 (341.2)	-0.61 (-122.72 to 64.58)	0.537
Males (38/30)	255.8 (359.1)	261.0 (303.1)	-0.13 (-122.16 to 64.01)	0.950
Duration of catheterization in hours				
All patients (91/89)	110.9 (146.5)	102.9 (127.8)	0.39 (-32.46 to 48.47)	0.697
Discharged < 48 hours of IDC removal (18/23)	60.0 (48.9)	46.0 (24.9)	1.19 (-9.76 to 37.77	0.241
Surgical patients (53/50)	71.0 (58.7)	61.9 (55.9)	0.80 (-13.40 to 31.44)	0.427
Females (60/61)	88.2 (82.4)	102.6 (141.4)	-0.68 (-56.17 to 27.33)	0.495
Males (31/28)	155.0 (219.1)	103 6 (93.6)	1.15 (-35.76 to 138.41)	0.256
Length of time to first void in hours				
All patients (83/79)	3.8 (2.6)	4.9 (2.9)	-2.59 (-1.99 to - 0.27)	0.010
Discharged < 48 hours of IDC removal (17/23)	3.6 (3.6)	4.8 (2.8)	-1.18 (-3.22 to 0.86)	0.231
Surgical patients (50/44)	3.8 (2.9)	5.0 (2.8)	-2.08 (-2.39 to - 0.05)	0.04
Females (50/56)	3.5 (2.5)	5.2 (2.7)	-3.30 (-2.67 to -0.66)	0.001
Males (33/23)	4.2 (2.9)	4.2 (3.4)	0.09 (-1.75 to 1.60)	0.933
Mean volume of first void				
All patients (80/68)	214.7 (171.1)	221.4 (142.9)	-0.26 (-58.48 to 45.10)	0.721
Discharged < 48 hours of IDC removal (12/20)	223.3 (144.9)	268.5 (109.5)	-1.00 (-137.38 to 47.05)	0.325
Surgical patients (47/40)	238.7(190.9)	221.7 (124.8)	0.48 (-53.16 to 87.08)	0.632
Females (52/45)	211.4 (166.4)	218.6 (132.9)	-.023 (-68.5 to 54.2)	0.817
Males (28/23)	213.2 (184.3)	226.9 (161.8)	-2.80 (-112.4 to 84.97)	0.781
Fluid intake previous 24 hours				
All patients (57/55)	1740.7 (1365.6)	1824.4 (1312.7)	-0.32 (-587.7 to 420.37)	0.915
Discharged < 48 hours of IDC removal (8/14)	2212.3 (1547.5)	1899.9 (1133.9)	0.55 (-883.72 to 1508.5)	0.592

Surgical patients (30/27)	1919.5 (1549.2)	1602.9 (1335.9)	0.82 (-455.5 to 1088.6)	0.415
Females (38/34)	1608.3 (1326.9)	1526.7 (1229.4)	0.27 (-521.94 to 683.05)	0.788
Males (19/21)	2173.5 (1552.2)	2306.3 (1328.1)	-0.29 (-1054.9 to 789.3)	0.772

Table 3: Reasons why patients were not discharged within 48 hours of urinary catheter removal.

	Morning group n (%)	Evening group n (%)
Failed trial of void	4 (4.6)	4 (5.2)
Other medical/surgical procedures	61 (70.0)	59 (76.6)
Waiting discharge orders/results	15 (17.3)	11 (14.3)
Waiting for bed/placement elsewhere	7 (8.1)	3 (3.9)

Table 4: Recatheterisation, urinary related post-discharge problems, physician visits and treatment for morning and evening groups.

Outcomes (Total No participants in morning/evening group)	Morning group	Evening group	Relative Risk (95% CI)
Recatheterisation/failed trial of void (98/97)	14 (14.3)	11 (11.3)	1.26 (0.60 – 2.64)
Post discharge urinary problems (84/86)			
Retention	8 (9.5)	8 (9.3)	1.02 (0.40 to 2.60)
Difficulty passing urine	8 (9.5)	9 (10.5)	0.91 (0.37 to 2.25)
Pain when passing urine	4 (4.8)	9 (10.5)	0.46 (0.15 to 1.42)
Loin pain	1 (1.2)	4 (4.6)	0.26 (0.03 to 2.24)
Febrile	4 (4.8)	7 (8.1)	0.59 (0.18 to 1.93)
Incontinent	11 (13.1)	7 (8.1)	1.61 (0.65 to 3.95)
Visited a GP or hospital doctor (82/86)	16 (19.5)	19 (22.1)	0.88 (0.49 to 1.60)
Treatment prescribed (16/19)			
Antibiotics	10 (62.5)	13 (68.4)	0.91 (0.56 to 1.49)
Increase fluid intake	0 (0.0)	8 (42.1)	0.07 (0.00 to 1.11) [1]
Urinalysis	5 (35.7)	12 (63.2)	0.57 (0.26 to 1.24)

[1] p = 0.010