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1 **Standards of care for feline urethral catheters in the United Kingdom**

2 Kate Holroyd BVetMed MRCVS

3 Karen Humm

4 The Lodge, Benington Lordship, Benington, Nr. Stevenage, Hertfordshire, SG2 7BS

5 Kholroyd@rvc.ac.uk

6 Khumm@rvc.ac.uk

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8 **Key Words:** Feline urethral catheter, general practitioner, antibiotics, sterility,

9 asepsis, closed urinary collection system

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16

17 **Abstract**

18 **Objectives**

19 This study aimed to determine the standards of care of urethral catheters (UCs) in
20 male cats with UCs placed due to urethral obstruction. It also assessed whether
21 these standards were affected by year of graduation of the veterinary surgeon (VS).

22 **Methods**

23 One hundred veterinary practices were randomly selected and a telephone survey
24 was conducted with a VS in the practice. Regarding the last urethral catheterisation
25 performed for a male cat with urethral obstruction the VS was asked about use of
26 antibiotics whilst the catheter was in situ, whether a closed urinary collection
27 system was used, whether aseptic skin preparation of the patient was performed
28 and whether aseptic hand preparation was performed. An ANOVA with a post hoc
29 Tukey HSD was used to determine whether there were significant differences in
30 these percentages when considering year of graduation.

31 **Results**

32 Twenty seven percent of VSs did not use antibiotics whilst the urethral catheter was
33 in place, 44% used closed urinary collection systems, 41% performed aseptic skin
34 preparation of the patient and 60% aseptically prepared their hands and wore
35 sterile gloves. VSs who graduated between 1975-1984 were significantly less likely
36 to wear sterile gloves and use closed urinary collection systems compared to VSs

37 who graduated between 2004-2013 ($p<0.05$). They were also significantly more
38 likely to use antibiotics with the urinary catheter in situ ($p<0.01$).

39 **Conclusions and relevance**

40 Non-sterile urethral catheter placement with open urinary drainage and antibiotic
41 prophylaxis is still a widespread practice amongst VSs; however, more recent
42 graduates are more likely to perform the procedure aseptically with a closed urinary
43 collection system and withholding antibiotics.

44 There is a need for further education in postgraduate vets in the prevention of
45 catheter associated urinary tract infections in cats and further research to provide
46 evidence-based guidelines for feline urethral catheter care.

47

48 **Introduction**

49 Feline lower urinary tract disease (FLUTD) is a broad term including any disorder
50 affecting the urinary bladder or urethra of cats (e.g. uroliths, urethral plugs,
51 bacterial infection).¹ Clinical signs include haematuria, stranguria, dysuria,
52 pollakiuria and periuria.¹ FLUTD is a common presentation, reported to account for
53 3% of feline consultations in a 1995 survey of primary care veterinary hospitals in
54 the United States.² The percentage of cats with FLUTD that present with urethral
55 obstruction (UO) has been found to range from 18% to 58%.^{3, 4, 5} Treatment for feline

56 UO involves placement of a urethral catheter which is recommended to be left in situ
57 for a variable time period depending on individual factors but generally 24-48
58 hours.⁶

59

60 Guidelines exist for urethral catheterisation in humans,⁷ and general principles from
61 these have been adapted for feline urethral catheter management. It is suggested
62 that feline urethral catheters are placed in an aseptic manner, that antibiotics are
63 not used prophylactically and that a closed urinary collection system is used to
64 reduce the incidence of catheter-associated urinary tract infection (CAUTI).⁶⁻⁸

65

66 To the authors' knowledge there is no research into the prevalence of the use of
67 aseptic technique, closed collection systems and antibiotics in cats undergoing
68 urethral catheterisation. The aim of this study was to determine the prevalence of
69 compliance with the advice on feline catheter management and a further aim was to
70 assess whether prevalence was affected by the year of graduation of the veterinary
71 surgeon performing the procedure.

72 **Materials and Methods**

73 A random number generatorⁱ was used to select veterinary practices from all those
74 listed on the Royal College of Veterinary Surgeons' 'Find a Vet' database. Each

75 practice was contacted by telephone and the first available veterinary surgeon was
76 surveyed. If no veterinary surgeon was available or if the veterinary surgeon
77 available had not placed a urethral catheter in a male cat with UO in the preceding
78 12 months no further data was collected. One hundred surveys were completed.
79 The gender and year of graduation of the veterinary surgeons were determined.
80 They were then asked, when considering the last male cat that they had placed a
81 urethral catheter in for UO:

- 82 1. Did you aseptically prepare the perineum and prepuce of the cat?
- 83 2. Did you aseptically prepare your hands and use sterile gloves?
- 84 3. Did you use a closed urinary collection system?
- 85 4. Did you give antibiotics whilst the urethral catheter was in-situ?

86

87 Clarification and explanation of the questions was provided if requested or if
88 confusion was apparent. The answers to the survey were analysed using statistical
89 software.ⁱⁱ Percentages of veterinary surgeons answering yes and no to each
90 question were calculated. A chi squared test was used to determine whether there
91 were significant differences in these percentages when considering year of
92 graduation with $p < 0.05$ being considered significant.

93

94 **Results**

95 Two hundred and forty-two veterinary practices were contacted to reach 100
96 veterinary surgeons eligible to be surveyed. Of these 57% (n=57) were female and
97 43% (n=43) were male. The year of graduation ranged from 1974 to 2013.
98 Veterinary surgeons were categorised into year groups. The results of the
99 questionnaire are summarised in Table 1. There was a significant difference in
100 antibiotic administration ($p<0.01$), use of closed urinary collection systems
101 ($p<0.01$) and aseptic hand preparation and gloving ($p<0.01$) between year groups.
102 There was no significant difference in aseptic preparation of the patients skin
103 between year groups ($p=0.051$).

104

105 **Table 1: responses to questions regarding the most recent urethral catheter placement in a**
 106 **male cat with urethral obstruction**

	Graduation Year Group				P value	Total population N= 100
	1975- 1984 N= 16	1985- 1994 N= 20	1995- 2004 N= 24	2005- 2013 N =40		
Antibiotics given (%)	100.0 (n=16)	80.0 (n=16)	79.0 (n=19)	55.0 (n=22)	0.004	73 (n=73)
Open urine drainage (%)	100.0 (n=16)	85.0 (n=17)	58.0 (n=14)	47.5 (n=19)	0.000	56 (n=66)
No aseptic skin preparation (%)	75.0 (n=12)	70.0 (n=14)	67.0 (n=16)	42.5 (n=17)	0.051	59 (n=59)
No aseptic hand preparation and gloving (%)	75.0 (n=12)	45.0 (n=9)	46.0 (n=11)	20.0 (n=8)	0.002	40 (n=40)

107

108 The percentage of veterinary surgeons that both aseptically prepared their hands
 109 and the cat's skin was 6.3% for vets graduating in the 1975-1984 group and
 110 increased to 50% for vets graduating in the 2005-2013 group. The percentage of
 111 veterinary surgeons that neither aseptically prepared their hands nor the cat's skin
 112 was 56.3% for vets graduating in the 1975-1984 group, which reduced to 12.5% for,
 113 vets graduating in the 2005-2013 group.

114

115 **Discussion**

116 This paper reports a survey of the standard of care provided by veterinary surgeons
117 in the United Kingdom performing urethral catheterisation in male cats with UO.
118 The study aimed to establish the prevalence of aseptic placement technique,
119 antibiotic usage and closed urinary collection system usage.

120

121 This study found that the 1975-1984 graduates reported using antibiotics 100% of
122 the time when placing urethral catheters in obstructed cats, compared to 55% of
123 2005-2013 graduates. Antibiotic usage whilst urethral catheters are in situ is
124 associated with multi-drug resistant bacterial urinary tract infections in dogs and
125 cats,⁸ and in feline guidelines published in 2011 it was recommended that
126 symptomatic CAUTI, (>1000 colony forming units (CFU)/ml of bacteria grown from
127 a quantitative culture of urine collected by cystocentesis)⁹ should be treated with
128 antibiotics but preferably after removal of the catheter, although it was recognised
129 that this may not be possible in all patients.⁹ A recent study of healthy female dogs
130 with asymptomatic bacteriuria found that no dogs with subclinical bacteriuria
131 developed clinical signs requiring antimicrobial treatment during the 3-month
132 observation period. It is therefore suggested that asymptomatic bacteriuria should
133 not be considered as an indication for antibiotics¹⁰. Although, human, canine and
134 feline evidence suggests that antibiotics should not be routinely used in patients

135 with indwelling urethral catheters, the present study did not question the reason for
136 antibiotic administration in these cases. A small percentage of cases where
137 antibiotics were used may have been appropriate, due to pre-existing urinary tract
138 infection, pyrexia or systemic infection, for example. However, the use of
139 antimicrobial drugs in 55-100% of cats (dependent on year of graduation) in the
140 present study is likely to be unwarranted in the majority of cases as the incidence of
141 bacterial urinary tract infection (UTI) in cats presenting for symptoms of FLUTD has
142 been found to be low. In one study 37% of cats with FLUTD presented with urethral
143 obstruction and of these 10% had significant bacteriuria ($>10^4$ CFU/ml) in
144 combination with crystals and/or uroliths, and only 2% had bacteriuria alone.³
145 Another study had similar results in which 55% of cats with FLUTD were obstructed
146 and none of these cats had a significant bacteriuria.⁴ In a recent Cochrane review in
147 human medicine, bacteriuria was found to be reduced with antibiotic usage during
148 urethral catheterisation, however, it selected for antibiotic resistant bacteria.¹¹ An
149 alternative approach suggested in human medicine to limit prophylactic antibiotic
150 usage, is to only use antibiotics in patients who are at high risk from complications of a
151 UTI, for example, those with implants, immunosuppression or diabetes.¹¹ Previous use
152 of antibiotics in cats with UTI's has also been found to be associated with multi-drug
153 resistant *Escherichia coli*¹².

154

155 One hundred percent of graduates from the group 1975-1984 reported using open
156 urine drainage compared to 47.5% of vets from the 2005-2013 group. Closed
157 urinary collection systems are used in human medicine due to evidence suggesting
158 that they result in reduced bacteriuria¹³ Although small animal studies directly
159 comparing the use of open urine drainage with closed urinary collection systems are
160 lacking, a 1981 study found the incidence of bacteriuria in cats with indwelling
161 urethral catheters was 56% in cats maintained with an open indwelling catheter¹⁴
162 and a more recent study using closed collection systems found that the probability
163 of CAUTI after 24 hours of catheterisation was 16.7% and this increased to 33.3%
164 after 48 hours.¹⁵ Closed urinary collection systems have the additional benefit that
165 urine is diverted away from the body and contained, thereby preventing discomfort,
166 urine scald and potential distress.

167

168 In humans, most microorganisms causing CAUTI derive from the patient's own
169 colonic and perineal flora or from the hands of health-care personnel during
170 catheter insertion or manipulation of the collection system.¹⁶ Expert opinion in
171 human medicine, clinical guidance and principles of best practice indicate that
172 aseptic technique is important in preventing CAUTI and consequently reducing
173 antibiotic usage.¹⁶ Currently veterinary surgeons were found to be poor at utilising
174 the aseptic technique recommended. Of the 100 vets sampled only 31 reported

175 performing both aseptic hand and patient skin preparation. The remaining 69% of
176 vets were either only performing one of these techniques or neither.

177

178 This study details the techniques reported by veterinary surgeons when placing
179 urethral catheters in feline patients with urethral obstruction. It relied on self-
180 report of an event happening up to 12 months prior to the questionnaire, potentially
181 leading to either intentional or unintentional misinformation being provided due to
182 poor recall or desire to provide the perceived 'correct' response respectively;
183 although it is felt that the latter is unlikely given the anonymised nature of the study.

184 The number of veterinary surgeons recruited was fair and allowed identification of
185 significant differences between graduating year groups. The data gathered was
186 limited to encourage full survey response, meaning that the reasons for the
187 decisions made were not analysed, which was probably particularly relevant
188 regarding antibiotic use. For example, if symptomatic bacteriuria was identified on
189 initial urinalysis when the urethral catheter was placed this could lead to
190 appropriate antibiotic use.

191

192 **Conclusions**

193 The study shows significant differences in techniques regarding performance and
194 management of feline urethral catheterisation reported by vets who graduated prior
195 to 1985. These differences likely reflect changes in teaching and the move towards
196 evidence based medicine over this time period. This study suggests that recent
197 graduates are more aware of the evidence-based techniques now recommended and
198 are maintaining a more responsible approach to antibiotic usage. By following the
199 aseptic guidelines and by using closed drainage systems the likelihood of a CAUTI
200 reduces and consequently so does the potential need for antibiotics. However,
201 further research is still required into the advantages of closed urinary collection
202 systems in cats.

203

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205 or not-for-profit sectors.

206 **Conflict of interest**

207 The authors do not have any potential conflicts of interest to declare.

208

209

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259 **Footnotes**

ⁱ Microsoft Excel 2010 v14.0.

ⁱⁱ IBM SPSS Statistics 21