

Esvaziamento vesical na Disfunção Neurogênica do Trato Urinário Inferior

José Carlos Truzzi

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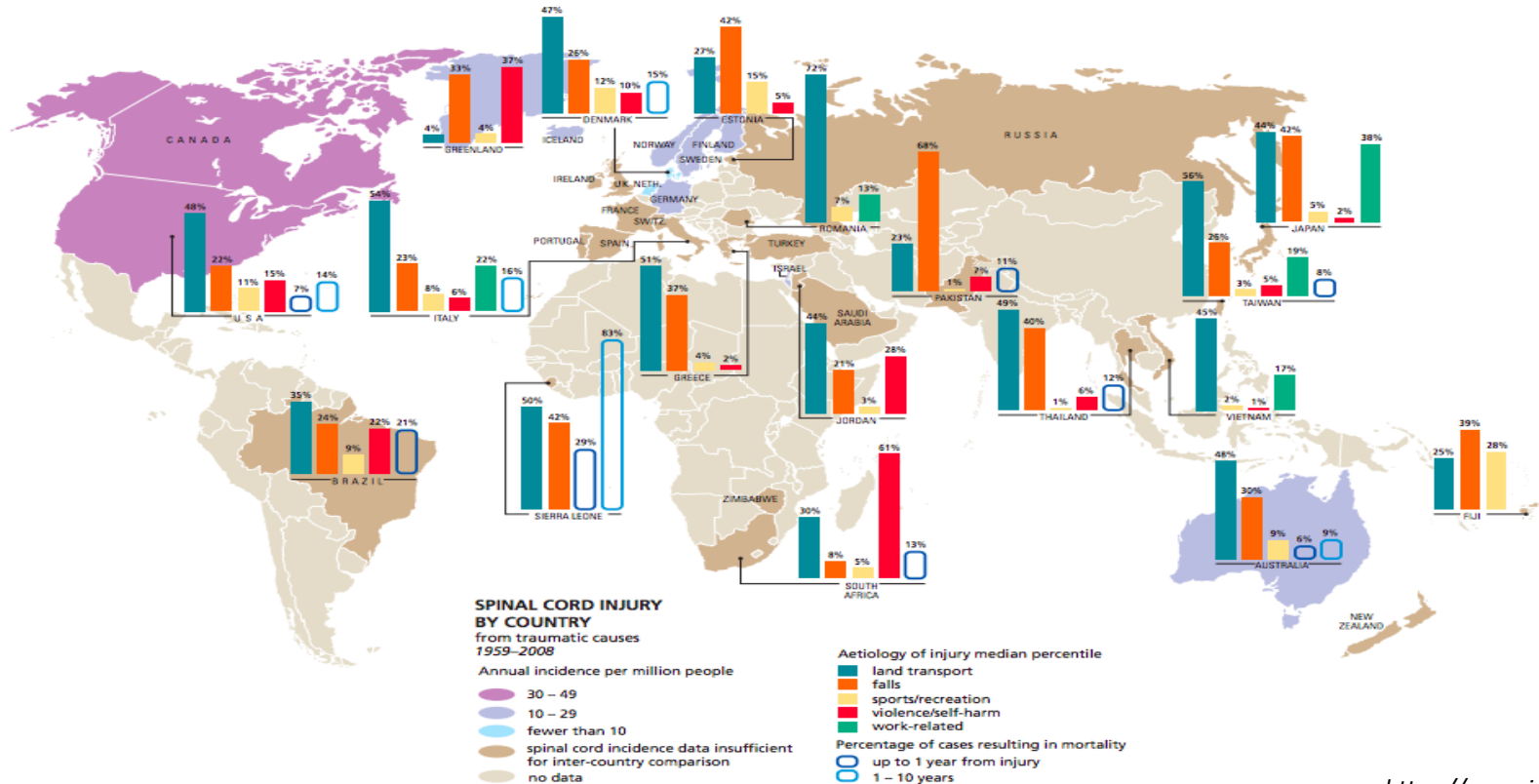
Chefe do Setor de Urologia – Grupo Fleury

Assistente do Departamento de Urologia – Instituto do Câncer Arnaldo Vieira de Carvalho (IAVC)

Conflitos de interesse

- De acordo com a Resolução 1595/2000 do Conselho Federal de Medicina e RDC 96/2008 da ANVISA declaro que tenho os seguintes conflitos de interesse relacionados ao tema:
 - Atuação científica – COLOPLAST

Estatística das lesões raquimedulares



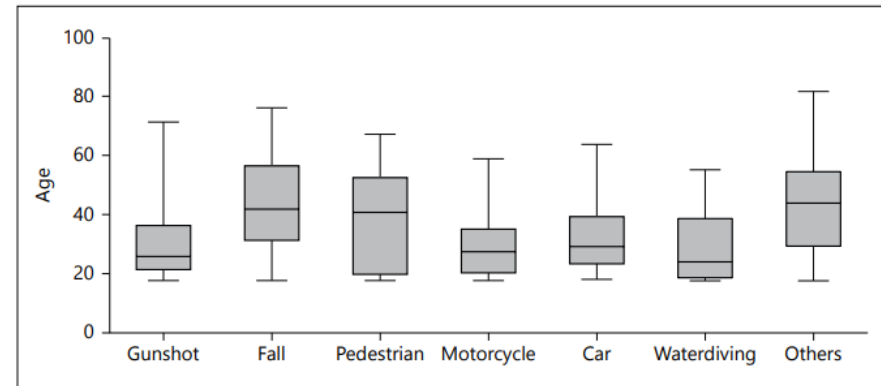
Contemporary Trends in the Epidemiology of Traumatic Spinal Cord Injury: Changes in Age and Etiology

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	After 2003 (n = 59)	2004–2008 (n = 82)	After 2009 (n = 207)	p
Mean age, years	26.0±11.8	31.5±12.8	37.9±15.7	<0.001
Cause of SCI, %				<0.001
Traffic injury	25.4	45.1	38.6	
Falls	25.4	24.3	31.4	
Gunshots	40.6	19.5	16.9	
Others	8.4	10.9	12.0	
Gender (male), %	79.6	87.8	85.0	0.409
ASIA score (A), %	57.6	67.0	69.5	0.228
Injury level (cervical), %	35.6	34.1	47.8	0.052



Guidelines EAU 2021

Summary of evidence	LE
Intermittent catheterisation is the standard treatment for patients who are unable to empty their bladder.	3
Indwelling transurethral catheterisation and suprapubic cystostomy are associated with a range of complications as well as an enhanced risk for UTI.	3

Recommendations	Strength rating
Use intermittent catheterisation, whenever possible aseptic technique, as a standard treatment for patients who are unable to empty their bladder.	Strong
Thoroughly instruct patients in the technique and risks of intermittent catheterisation.	Strong
Avoid indwelling transurethral and suprapubic catheterisation whenever possible.	Strong

Complicações do cateterismo intermitente

- Cateterismo intermitente – método padrão de esvaziamento vesical
 - Superior a outros métodos
 - Não isento de complicações
- Infecção urinária (sintomática): 2,6% a 81%
 - Se ITU e retenção: início do CIL reduz ITU
 - Se ITU e CIL com técnica inadequada: persistência da ITU
- Uretrorragia: até 1/3 pacientes a longo prazo
- Estenose de uretra (significativa): 1,5% a 4%

Bacterial adherence to urethral catheters

Roberts JA, Fussell EN, Kaack MB

J Urol 1990; 144: 264-69

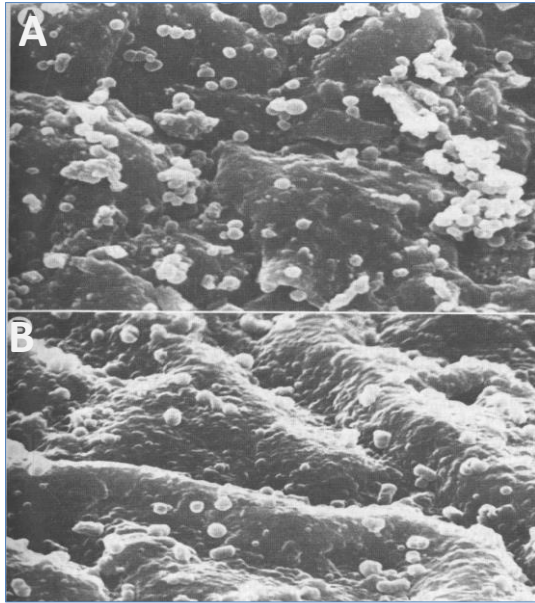


Fig 1. adesão bacteriana (*S. aureus*) na superfície externa (A) e interna (B) de cateter de borracha

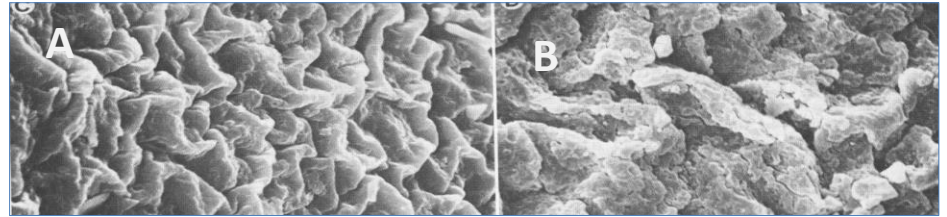





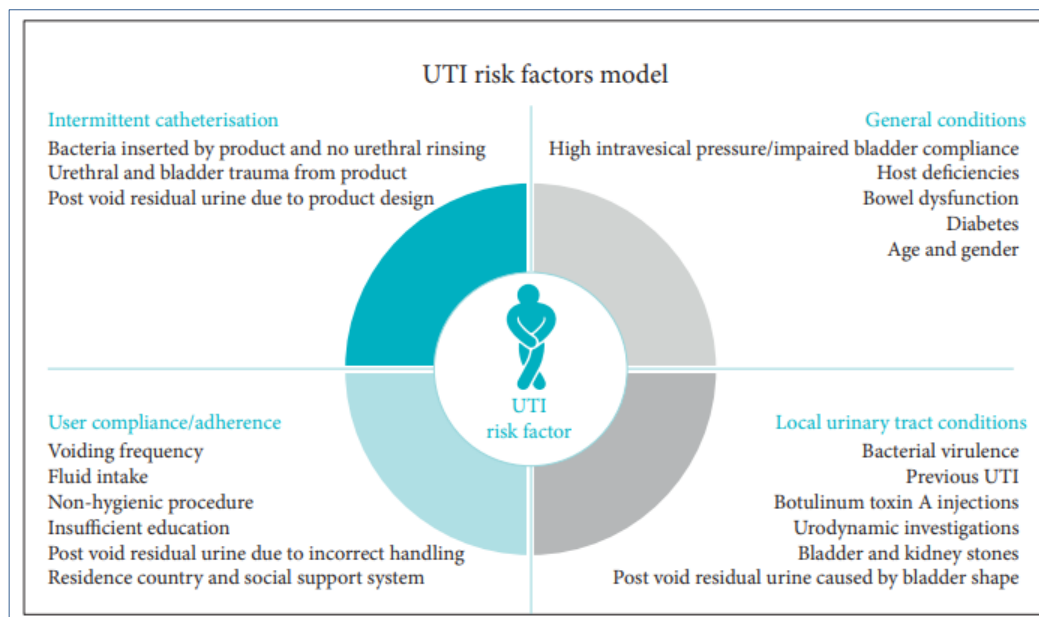


Fig 2. Ausência de adesão bacteriana superfície externa (A) e interna (B) de cateter hidrofílico

Adult Neurogenic Lower Urinary Tract Dysfunction and Intermittent Catheterisation in a Community Setting: Risk Factors Model for Urinary Tract Infections

Michael Kennelly ¹, Nikesh Thiruchelvam,² Márcio Augusto Averbeck ³,
Charalampos Konstantinidis,⁴ Emmanuel Chartier-Kastler,⁵ Pernille Trøjgaard ⁶,
Rikke Vaabgaard ⁶, Andrei Krassioukov,^{7,8} and Birte Petersen Jakobsen ⁹



Intermittent catheterization with a hydrophilic-coated catheter delays urinary tract infections in acute spinal cord injury: a prospective, randomized, multicenter trial.

Cardenas DD, Moore KN, Dannels-McClure A, Scelza WM, Graves DE, Brooks M, Busch AK.

PM R. 2011; 3(5):408-417

- Estudo randomizado
- Lesados medulares – fase aguda
- Cateter hidrofílico
 - 21% menos ITU no período de hospitalização ($p < 0,05$)
 - Redução 33% no desenvolvimento da primeira infecção urinária sintomática

ORIGINAL ARTICLE

Cost-Effectiveness Analysis of Long-Term Intermittent Self-Catheterization with Hydrophilic-Coated and Uncoated Catheters in Patients with Spinal Cord Injury in Japan

Toyohiko WATANABE,^{1*} Shingo YAMAMOTO,² Momokazu GOTOH,³
Tadanori SAITOH,⁴ Osamu YOKOYAMA,⁵ Tatsunori MURATA,⁶ and
Masayuki TAKEDA⁷

	Cost (yen)	QALYs	LYG (year)	Pyuria events†
Uncoated catheters	5 112 621	3.872	9.233	64.63
Hydrophilic-coated catheters	6 392 507	4.206	10.014	56.25
Incremental values	1 279 886	0.334	0.781	-8.38
ICER (yen/QALY gained)		3 826 351 yen/QALY gained		
ICER (yen/LYG)		1 639 562 yen/LYG		
ICER (yen/pyuria event avoided)		152 731 yen/pyuria event avoided		

†Pyuria events were not discounted. ICER, incremental cost-effectiveness ratio; LYG, life year gained; QALY, quality adjusted life year.

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Masayuki TAKEDA⁷

TABLE 6. Deterministic univariate sensitivity analysis

Parameter	Values tested	ICER (yen/QALY)	Source
Deterministic base case	—	3 826 351	—
<i>Monthly cost of hydrophilic-coated catheters</i>			
Base case	34 000 yen	—	—
Alternative	26 000 yen	952 369	Assumed
	42 000 yen	6 700 334	Assumed
<i>UTI risk associated with uncoated catheter use per year</i>			
Base case	1.22	—	—
Alternative	0.96	4 172 121	Fujikawa 2004 ¹¹
	1.70	3 391 313	Cardenas 2009 ⁶
<i>Reduction of UTI rate with hydrophilic-coated catheters</i>			
Base case	0.79 (21%)	—	—
Alternative	0.47 (53%)	1 897 284	Discharge period: Cardenas 2009 ⁶
	0.90 (10%)	6 269 808	Whole treatment period: Cardenas 2009, ⁶ Cardenas 2011, ¹⁷ De Ridder 2005 ⁷
<i>Time horizon</i>			
Base case	60 years	—	—
Alternative	40 years	3 826 352	Assumed
	70 years	3 826 351	
<i>Starting age</i>			
Base case	57	—	—
Alternative	48	4 320 739	Mean age in Shingu 1995 ¹
	66	3 550 865	Mean age in Katoh 2014 ¹³
<i>Discount rate</i>			
Base case	2%	—	—
Alternative	0%	3 551 330	According to Japanese guidelines on HTA
	4%	4 121 262	

ICER, incremental cost-effectiveness ratio; UTI, urinary tract infection.

Cost-effectiveness of hydrophilic-coated intermittent catheters compared with uncoated catheters in Canada: a public payer perspective

Blayne Welk, Wanrudee Isaranuwachai, Andrei Krassioukov, Louise Husted Torp & Dean Elterman

Table 3. Probabilistic cost-effectiveness results.

	Costs	QALYs	LYG	UTI events
Base case				
Uncoated catheters	\$72,622	5.37	12.36	37
Hydrophilic-coated intermittent catheters	\$120,639	6.09	13.14	33
Incremental findings	\$48,016	0.72	0.79	4
ICER		\$66,634.33	\$61,037.02	\$13,088.91
Scenario including societal costs				
Uncoated catheters	\$1,884,681	5.37	12.36	37
Hydrophilic-coated intermittent catheters	\$1,730,221	6.09	13.14	33
Incremental findings	-\$154,460	0.72	0.79	4
ICER		Dominant	Dominant	Dominant
Scenario including utility gain from compact catheters				
Uncoated catheters	\$72,622	5.37	12.36	37
Hydrophilic-coated intermittent catheters	\$120,639	6.49	13.14	33
Incremental findings	\$48,016	1.12	0.79	4
ICER		\$42,821.05	\$61,037.02	\$13,088.91
Scenario including utility gain from phthalate-free catheters				
Uncoated catheters	\$72,622	5.37	12.36	37
Hydrophilic-coated intermittent catheters	\$120,639	6.58	13.14	33
Incremental findings	\$48,016	1.21	0.79	4
ICER		\$39,852.00	\$61,037.02	\$13,088.91
Scenario including utility gain from compact catheters and phthalate-free catheters				
Uncoated catheters	\$72,622	5.37	12.36	37
Hydrophilic-coated catheters	\$120,639	6.98	13.14	33
Incremental findings	\$48,016	1.60	0.79	4
ICER		\$29,942.04	\$61,037.02	\$13,088.91

Can hydrophilic coated catheters be beneficial for the public healthcare system in Brazil? - A cost-effectiveness analysis in patients with spinal cord injuries.

José Carlos Truzzi, Vanessa Teich, Camila Pepe
Int Braz J Urol. 2018 Jan-Feb;44(1):121-131

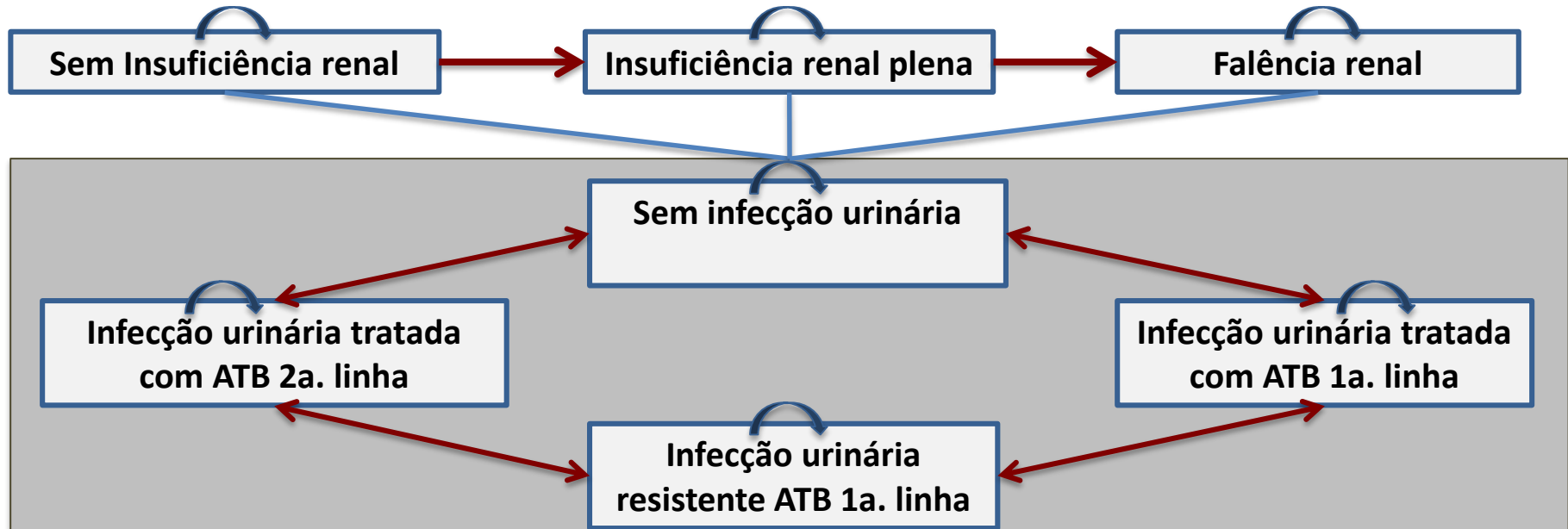


- **Objetivo**

- Avaliar custo-efetividade de dois cateteres (hidrofílico vs PVC) para cateterismo intermitente sob a perspectiva do sistema público brasileiro

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- Cenário base

- Cateter hidrofílico foi custo-efetivo

- R\$ 57.432 / LYG
 - R\$ 122.330 / QALY

- Redução de infecção urinária

- + R\$ 31.240 - redução 6% de infecções urinárias (toda a vida)

4 cateterismos/dia

1/2 tubo lubrificante/vez

Taxa resistência: 34%

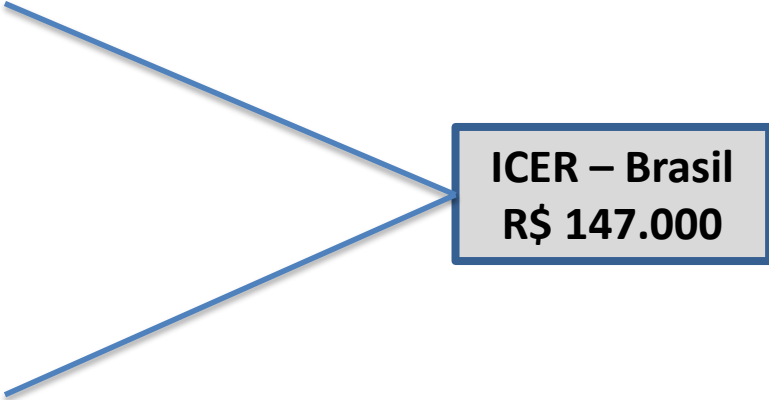
Custo UTI: R\$ 60,50/dia

Custo sepse: R\$ 708,36

Can hydrophilic coated catheters be beneficial for the public healthcare system in Brazil? - A cost-effectiveness analysis in patients with spinal cord injuries.

*José Carlos Truzzi, Vanessa Teich, Camila Pepe
Int Braz J Urol. 2018 Jan-Feb;44(1):121-131*

- Lubrificante
 - ANVISA: recomenda uso único
 - 2 tubos /dia → 4 tubos /dia
 - R\$ 122.330 / QALY → R\$ 86.831 /QALY
- Taxa de resistência à Ciprofloxacina
 - 34,0% → 16,5%
 - R\$ 122.330 / QALY → R\$ 122.527 /QALY



ICER – Brasil
R\$ 147.000

Can hydrophilic coated catheters be beneficial for the public healthcare system in Brazil? - A cost-effectiveness analysis in patients with spinal cord injuries.

*José Carlos Truzzi, Vanessa Teich, Camila Pepe
Int Braz J Urol. 2018 Jan-Feb;44(1):121-131*

Table 3 - Cost-effectiveness results of primary analysis (all adverse events).

	Cost (BRL)	QALYs	LYG	UTI
Conventional PVC	17,255	2.550	5.689	54.73
Hydrophilic coated	48,476	2.805	6.233	51.53
Incremental values	31,221	0.255	0.544	-3.20
ICER (BRL/QALY gained)		122,330 BRL per QALY		
ICER (BRL/LYG)		57,432 BRL per LYG		

**ICER – Brasil
R\$ 147.000**

Can hydrophilic coated catheters be beneficial for the public healthcare system in Brazil? - A cost-effectiveness analysis in patients with spinal cord injuries.

*José Carlos Truzzi, Vanessa Teich, Camila Pepe
Int Braz J Urol. 2018 Jan-Feb;44(1):121-131*

Table 4 - Cost effectiveness results of secondary analysis (UTIs).

	Cost (BRL)	QALYs	LYG	UTI
Conventional PVC	17,255	2.550	5.689	54.73
Hydrophilic coated	48,495	2.805	6.233	51.53
Incremental values	31,240	0.255	0.544	-3.20
ICER (BRL/QALY gained)		122,406 BRL per QALY		
ICER (BRL/LYG)		57,468 BRL per LYG		
ICER (BRL/UTI avoided)		9,778 BRL saved per UTI avoided		

**ICER – Brasil
R\$ 147.000**

Intermittent catheterization with single- or multiple-reuse catheters: clinical study on safety and impact on quality of life

Diane K Newman, Peter W New, Roxana Heriseanu, Sarunas Petronis, Joakim Håkansson, Maria Å Håkansson, Bonsan Bonne Lee

Int Urol Nephrol. 2020 Mar 14. doi: 10.1007/s11255-020-02435-9

- 39 pac CIL há 10 anos - 6x/d
- Entrada – todos reuso (21 dias)
- Score ISC-Q: 58 para 67 (p=0,01)
- 83% preferiram manter cateter uso único

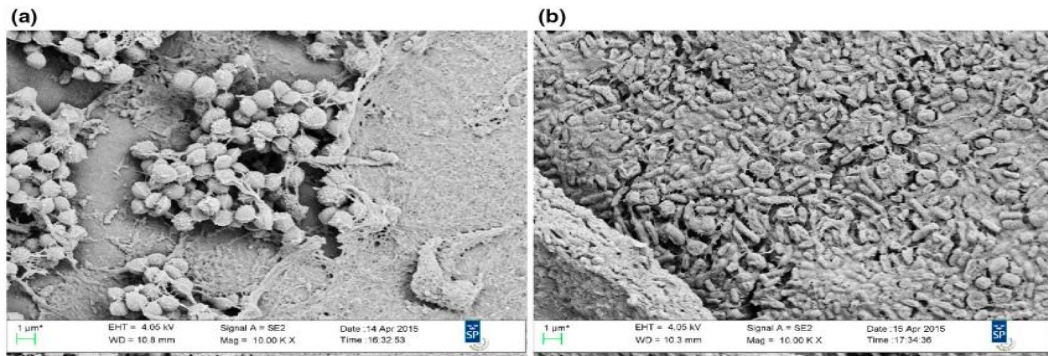


Fig. 1 SEM pictures of microorganism contamination and occurrence of biofilm in two different reused catheters; **a** Culturing verified CFU count of 3.9×10^4 and identified species included *Staphylococcus*

saprophyticus and *Escherichia coli*. **b** Culturing verified CFU count of 1.1×10^7 and identified species included *Pseudomonas aeruginosa*, *Ochrobactrum anthropi*, and *Klebsiella pneumoniae*

100% cateteres
contaminados com
debris

74% com
microorganismos
(biofilme)

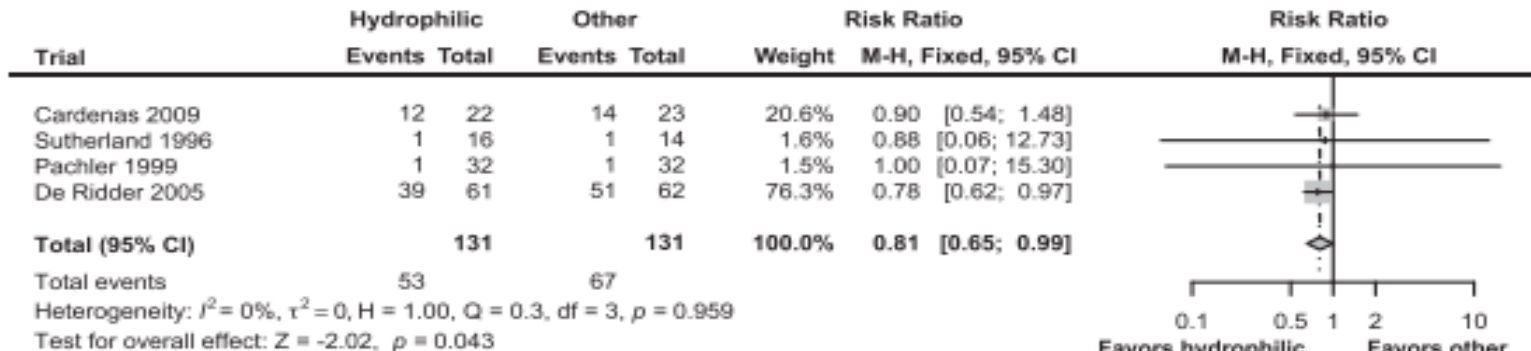
O Cateter uretral

- Controvérsia na literatura: uso único vs reuso; hidrofílico vs não-hidrofílico
- Limpeza e reutilização do cateter é adotada com certa frequência
 - Limpeza: saponáceos, álcool, microondas.....
- Atletas para-olímpicos (Londres 2012): infecção 4:1 com cateteres reutilizáveis (Spinal Cord. 2015;53:78-82)
- Menor risco de infecção e melhor custo-efetividade com uso único do cateter (Can Urol Assoc J 2019;13(2):64-9)

Intermittent Catheterization: The Devil Is in the Details

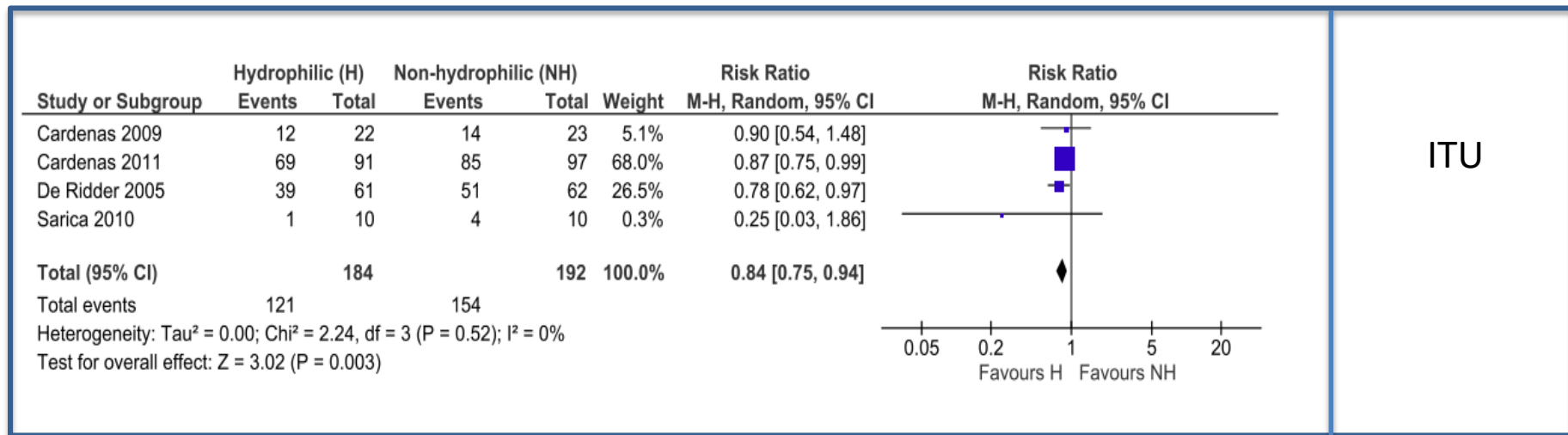
Kathleen Christison, Matthias Walter, Jean-Jacques J.M. Wyndaele, Michael Kennelly,³ Thomas M. Kessler, Vanessa K. Noonan,
Nader Fallah and Andrei V. Krassioukov
JOURNAL OF NEUROTRAUMA 35:985–989

- Problemas na revisão Cochrane
 - Seleção de dados / Extração dos dados / Definição de ITU sintomática / Análise dos dados
- Tendência favorável cateter uso único vs reuso – definição IDSA
- Favorável a cateter hidrofílico vs não-hidrofílico



Intermittent catheterisation with hydrophilic and non-hydrophilic urinary catheters: systematic literature review and meta-analyses.

Rognoni C, Tarricone R. *BMC Urol.* 2017;17(1):4.



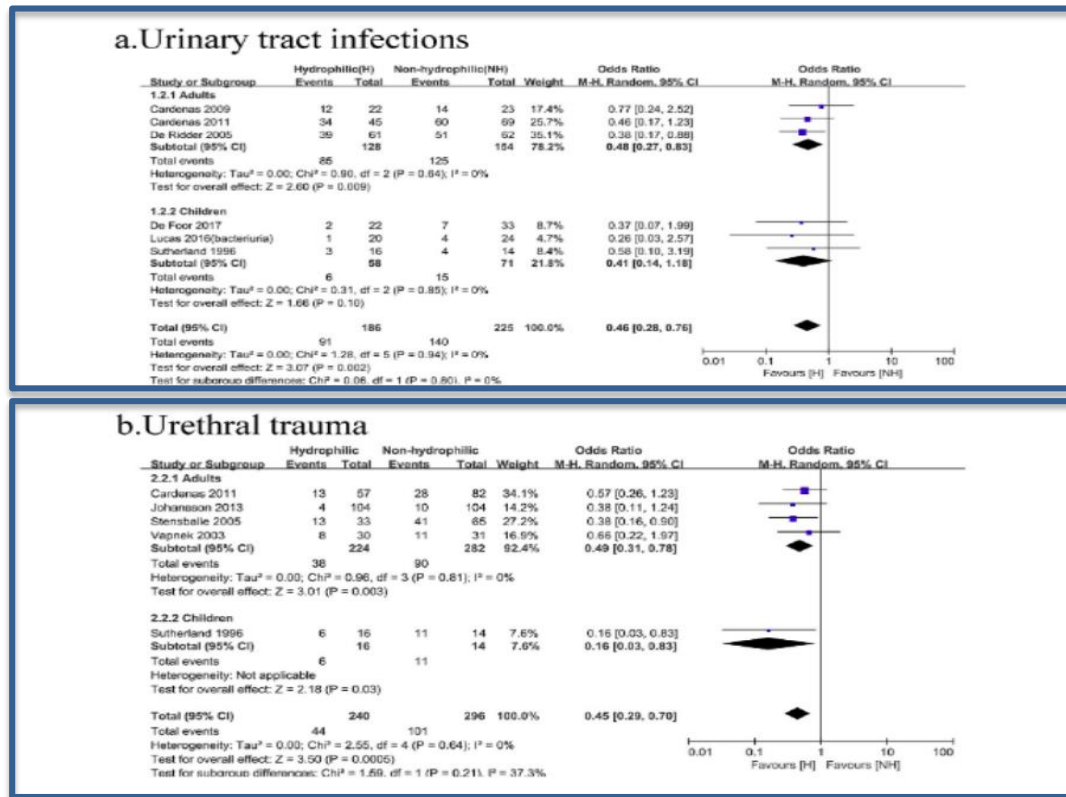
ITU

Outcomes comparison of hydrophilic and non-hydrophilic catheters for patients with intermittent catheterization: An updated meta-analysis.

Feng D, Cheng L, Bai Y, Yang Y, Han P.

Asian J Surg. 2020;43(5):633-635.

“Despite the tendency to use HC, it remains controversial about the optimal type and technique of catheters and most clinicians still make decisions based on their clinical experience. **The latest meta-analysis confirmed the benefits of HC in both urinary tract infection (UTI) and urethral trauma, but they did not consider the effects of age, patient preference, compliance, QoL and cost on the economic sustainability of HC.** Thus, we decided to perform an updated meta-analysis of HC versus NHC with regard to UTI, urethral trauma, patient's satisfaction and cost-effectiveness.”



Antimicrobial resistance

World Health Day – 7 April 2011

Antimicrobial resistance: no action today, no cure tomorrow

GLOBAL ACTION PLAN ON ANTIMICROBIAL RESISTANCE



Era pós-antibiótica

Infecções banais sem possibilidade
de cura

- Poucos investimentos no desenvolvimento de novos antibióticos
- Mortes por bactérias resistentes passarão de 700.000/ano (2016) para 10.000.000/ano (2050)
- Custo estimado de US\$10 trilhões
- Queda do PIB mundial: pode chegar a 3,8%

Final Report

DRUG-RESISTANT INFECTIONS

A Threat to Our Economic Future

March 2017



WORLD BANK GROUP

Jonas, Olga B.; Irwin, Alec; Berthe, Franck Cesar Jean; Le Gall, Francois G.; Marquez, Patricia V. 2017.
Drug-resistant infections: a threat to our economic future (Vol. 2) : final report (English). HNP/Agriculture Global Antimicrobial Resistance Initiative.
Washington, D.C.: World Bank Group.
<http://documents.worldbank.org/curated/en/323311493396993758/final-report>

Gigantes farmacêuticas lançam fundo de US\$ 1 bilhão para desenvolver novos antibióticos

Por Bloomberg | 09/07/2020 - 12:57



O fundo vai investir em pequenas empresas que estão desenvolvendo novos tratamentos antibacterianos (Imagem: Pixabay)

Gigantes farmacêuticas estão lançando um fundo de US\$ 1 bilhão destinado ao desenvolvimento de novos antibióticos, área que muitas delas abandonaram nos últimos anos.

Apoiado por empresas como **Pfizer**, Merck, Eli Lilly e GlaxoSmithKline, o fundo vai investir em pequenas empresas que estão desenvolvendo novos tratamentos antibacterianos, segundo um comunicado. Um de seus objetivos é evitar de dois a quatro novos antibióticos aos pacientes até 2030.



Catheters for intermittent catheterization: a systematic review and network meta-analysis

Donghui Ye¹ · Yuntian Chen² · Zhongyu Jian¹ · Banghua Liao¹ · Xi Jin¹ · Liyuan Xiang¹ · Hong Li¹ · Kunjie Wang¹

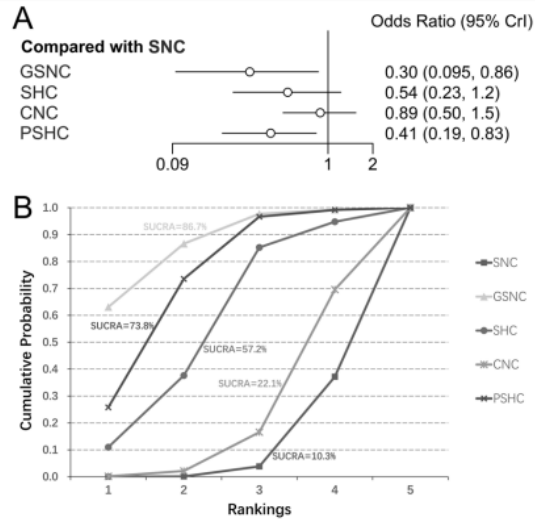
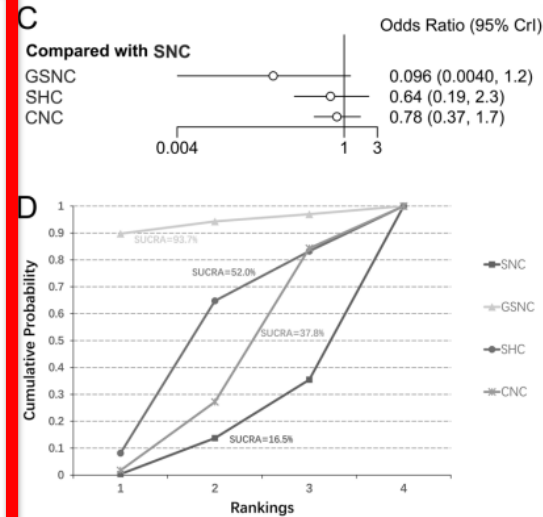


Fig. 2 Analysis of symptomatic UTI and asymptomatic bacteriuria. **A** Forest plot of symptomatic UTI, with single-use non-coated catheter as the comparator; **B** SUCRA plot of symptomatic UTI; **C**



D Forest plot of asymptomatic bacteriuria, with single-use non-coated catheter as the comparator; **D** SUCRA plot of asymptomatic bacteriuria.



Catheters for intermittent catheterization: a systematic review and network meta-analysis

Donghui Ye¹ · Yuntian Chen² · Zhongyu Jian¹ · Banghua Liao¹ · Xi Jin¹ · Liyuan Xiang¹ · Hong Li¹ · Kunjie Wang¹

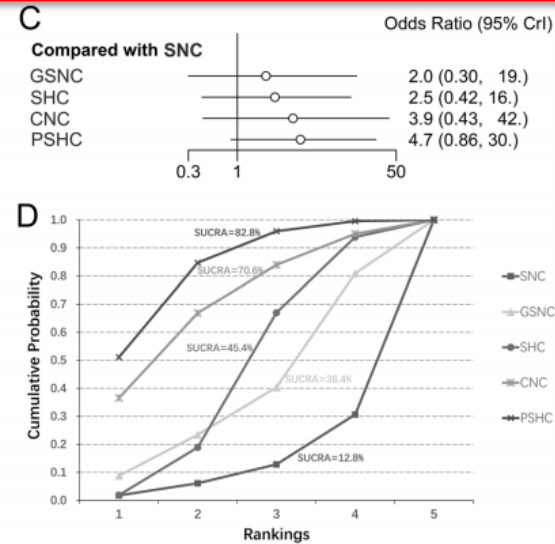
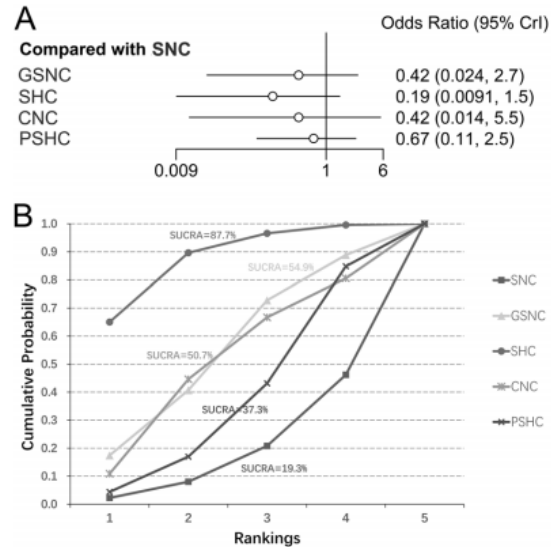


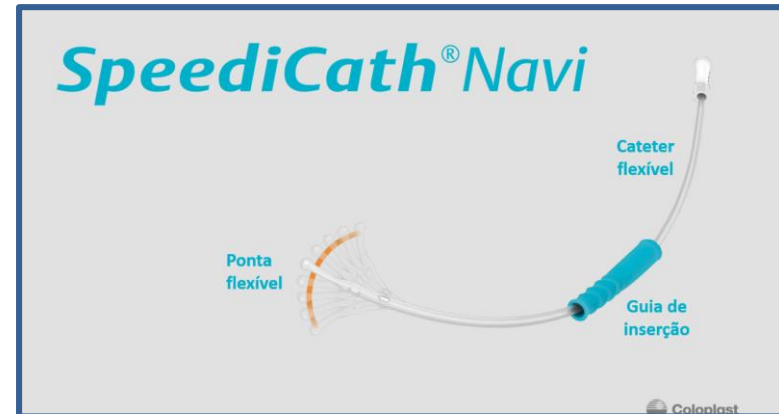
Fig. 3 Analysis of haematuria and patient satisfaction. **A** Forest plot of haematuria, with single-use non-coated catheter as the comparator; **B** SUCRA plot of haematuria;

C forest plot of patient satisfaction, with single-use non-coated catheter as the comparator; **D** SUCRA plot of patient satisfaction.

Aderência ao cateterismo intermitente

- Multicêntrico – 10 centros de reabilitação
- 100 pacientes
 - 30 diferentes cateteres (uso basal) vs cateter pronto para uso
 - 90% médicos: pronto para uso - melhor aderência
 - 80% pacientes: fácil curva de aprendizado
 - 69% cateter pronto mais fácil que o *standard*
 - 89% inserção fácil ou muito fácil
 - 91% retirada fácil ou muito fácil

Arch Esp Urol. 2020 Mar;73(2):107-112.



Intermittent catheterization with single- or multiple-reuse catheters: clinical study on safety and impact on quality of life

Diane K. Newman¹ · Peter W. New^{2,3,4} · Roxana Heriseanu⁵ · Sarunas Petronis⁶ · Joakim Håkansson⁶ · Maria Å. Håkansson⁷ · Bonsan Bonne Lee⁸

Received: 30 October 2019 / Accepted: 26 February 2020
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Table 3 Total and domain ISC-Q scores

	Ease to use			Convenience			Discreetness			Psychological			Total score		
	Reuse	Single-use	Diff.	Reuse	Single-use	Diff.	Reuse	Single-use	Diff.	Reuse	Single-use	Diff.	Reuse	Single-use	Diff.
N	39	36	36	39	36	36	39	36	36	39	36	36	39	36	36
Min	13	22	-78	0	0	-75	0	38	-54	0	13	-42	24	29	-43
Median	59.38	78.13	14.06	50.00	62.50	6.25	66.67	83.33	8.33	41.67	52.08	4.17	53.39	69.14	7.94
Max	100	100	47	100	100	100	100	100	88	100	100	63	98	98	49
Mean	62.66	74.65	12.24	55.61	60.07	4.34	65.45	76.62	11.27	48.27	57.41	9.84	58.00	67.19	9.42
SD	20.12	19.71	25.93	30.88	28.94	40.55	27.34	21.46	29.88	30.72	28.97	22.03	22.57	17.70	22.29
<i>p</i> value ^a	NA	NA	0.0016	NA	NA	0.5447	NA	NA	0.0331	NA	NA	0.0121	NA	NA	0.0101

NB. A high score is indicative of greater satisfaction with the catheter (max = 100)

^aWilcoxon signed rank test. 2-sided

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Received: 30 October 2019 / Accepted: 26 February 2020
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Table 4 Patient-reported outcomes

	Reuse catheter (<i>n</i> = 39)	Single-use hydrophilic catheter (<i>n</i> = 36)	<i>p</i> value ^a
Sensation during catheterization, <i>n</i> (%)			0.0192
Comfortable	6 (15%)	10 (28%)	
No discomfort	16 (41%)	14 (39%)	
Slight discomfort	12 (31%)	10 (28%)	
Slight pain	3 (8%)	2 (5%)	
Disturbing pain	2 (5%)	–	
Satisfaction, <i>n</i> (%)			0.0241
Very satisfied	9 (23%)	18 (50%)	
Satisfied	12 (31%)	12 (33%)	
Neutral	13 (33%)	2 (6%)	
Not satisfied	4 (10%)	3 (8%)	
Absolutely not satisfied	1 (3%)	1 (3%)	
Urological symptoms/problems due to catheterization	28 (72%)	12 (33%)	0.0024

Testing the hypotheses that equal number perceived and improvement as a worsening

^aThe Binomial test (equivalent to the McNemar test). 2-sided

Considerações finais

- Mau esvaziamento vesical: cateterismo vesical intermitente
- Cateter hidrofílico: menor risco de complicações
- Cateter hidrofílico: custo efetivo
- Infecção urinária: preocupação global



Obrigado