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Aseptic Technique: The Emperor's New Clothes?

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Overview

- Discuss what is meant by an aseptic technique & how it should be performed
- Present the evidence base surrounding the key aspects of central venous catheter care
- Review how the efficacy of the technique can be demonstrated

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What is an aseptic technique?

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Asepsis

- The absence of pathogenic organisms or their toxins from the blood or tissues
- Difficult to achieve
- Pathogenic organisms are present in many different areas of the body
- Can be harmful if enter a vulnerable site, for example CVC hub

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Aseptic technique

METICULOUS

“Necessary infection control measures to prevent pathogenic micro-organisms on hands, surfaces or equipment from being introduced into susceptible sites during clinical practice”

FULL

STRICT

Dougherty et al (2010)

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Aseptic Non Touch Technique

- Peer reviewed & tested clinical guidelines
 - Basic infection prevention & control principles
- Improve the efficacy of, & standardize, aseptic technique thereby reducing HCAI
- Surgical or standard depending on length & complexity of procedure

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Aseptic technique: The evidence base

- No clinical or economic evidence that any one approach is more clinically or cost-effective than another
- All recommendations are Class D/GPP¹

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¹epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England, Loveday et al (2014)

What technique would you recommend for parenteral nutrition?

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Standard

- Technically complicated procedures
- > 20 minutes in length
- Large open key sites
- Large/numerous key parts

Surgical

- Technically uncomplicated procedures
- < 20 minutes in length
- Small key sites
- Minimal key parts

Principles are the same. The main difference is the complexity of the aseptic field & how it is managed



A

Always wash hands effectively

N

Never contaminate key parts

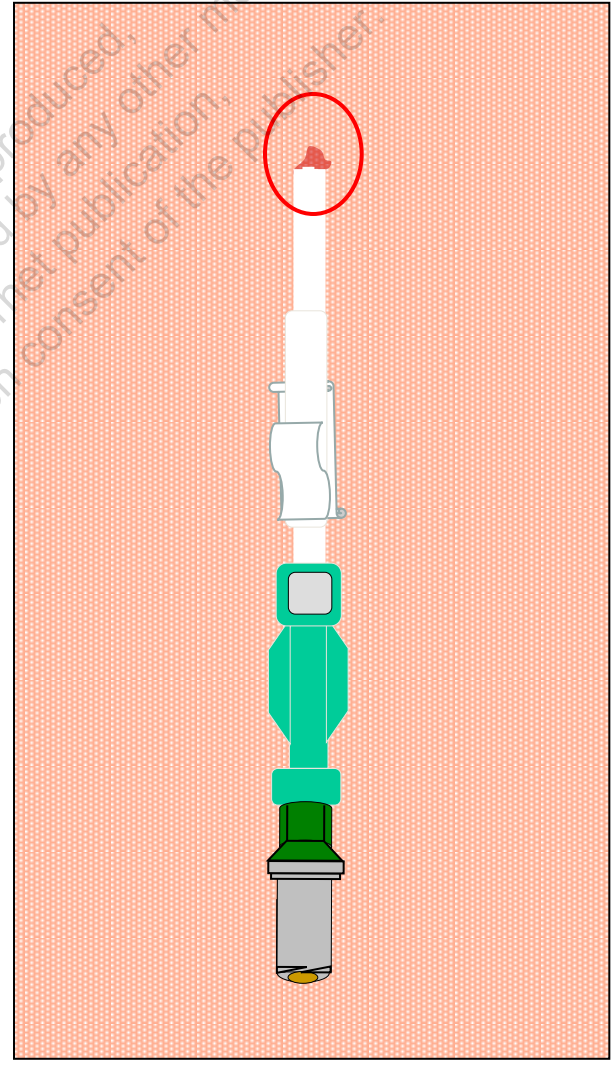
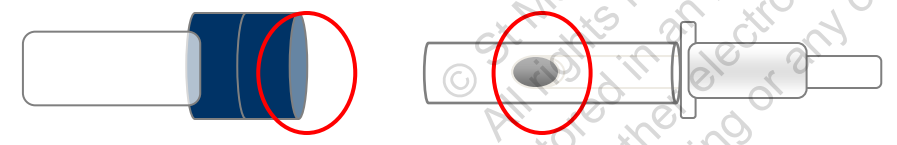
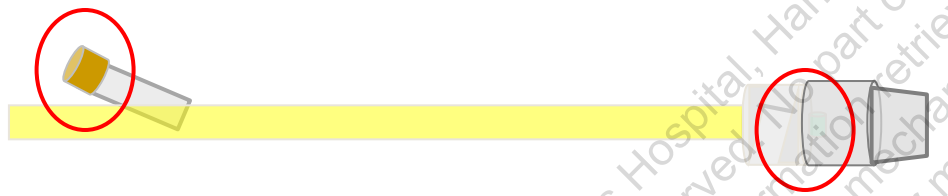
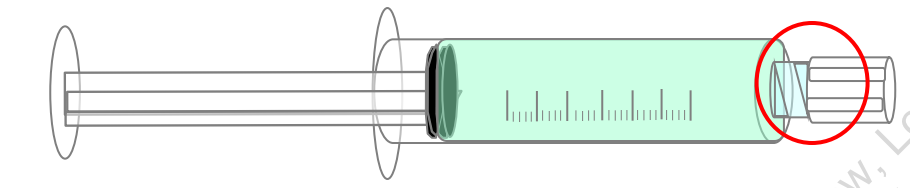
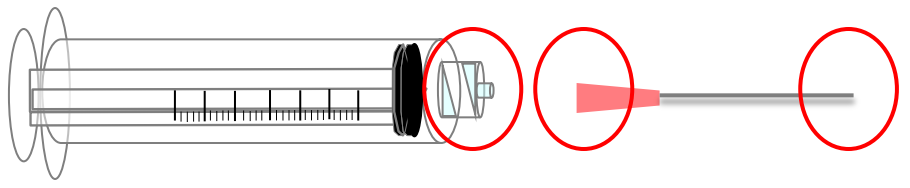
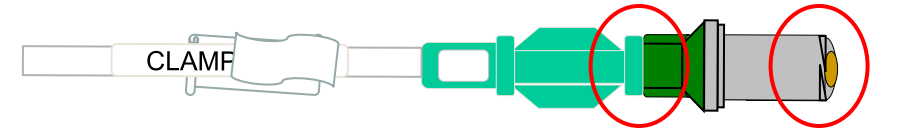
T

Touch non-key parts with confidence

T

Take effective infection control precautions

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Should the technique be
standardised?

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Current position

- A standardised procedure for home parenteral nutrition is lacking
- Confusing for patients & staff
- Could impact patient outcomes
- Biggest impact on home care nursing
- If we are basing our practice on the same evidence why do these differences exist?

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Variation in practice

	Word count	No of sentences	No of steps	Items needed	Frequency of hand washing	Frequency of alcohol rub
Mean ± SD	299 ± 114	43 ± 13.4	19 ± 5.3	13 ± 4.3	2 ± 1	2 ± 1.3
Min	67	14	7	8	1	0
Max	563	76	35	28	5	6
Median	281	42	18	13	2	2

Small et al (2013) Tripartite Abstract. Variation in parenteral nutrition procedures: is it time for a unified approach

Which elements of central venous catheter care are evidence-based?

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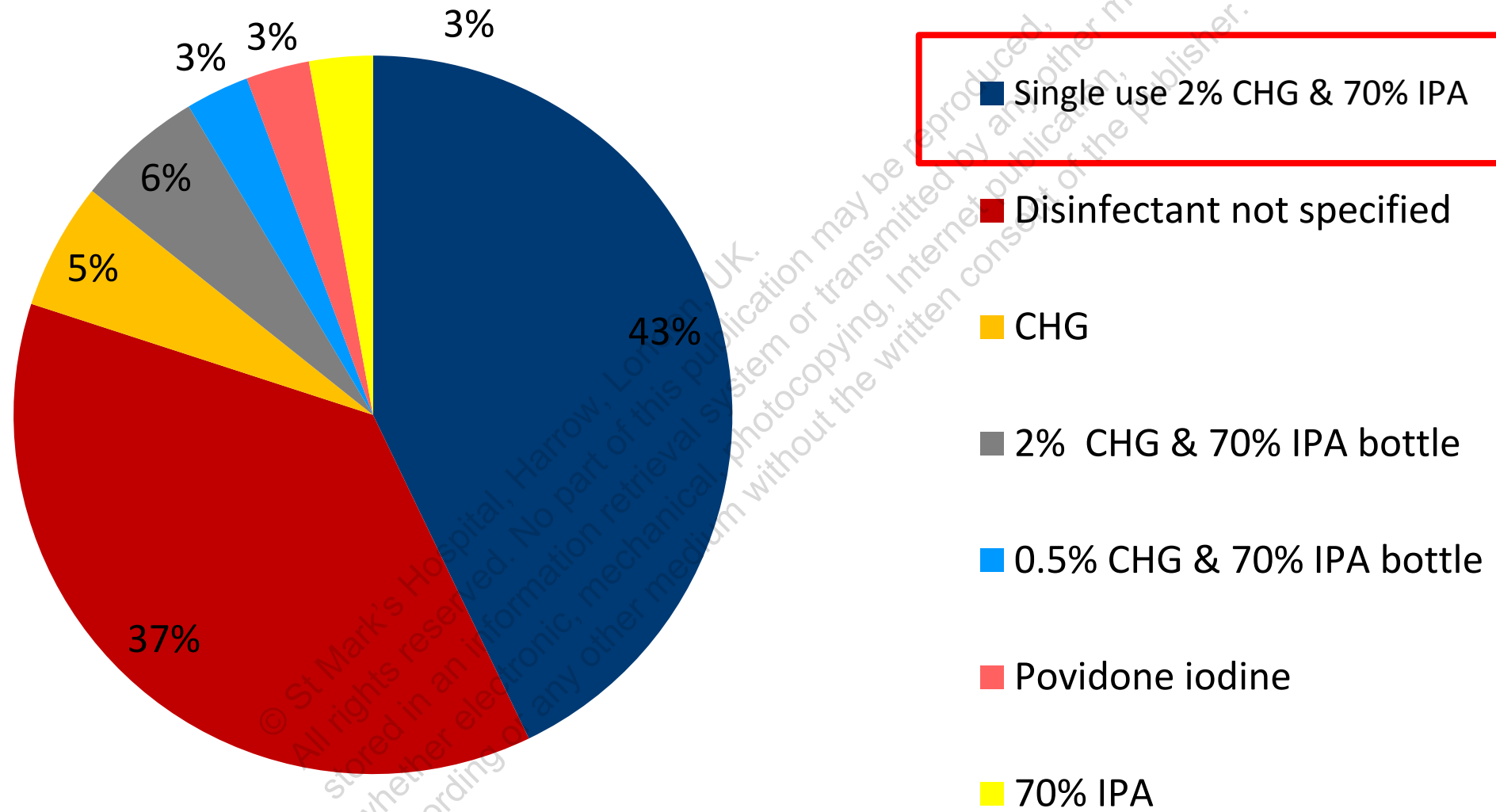


Evidence based elements of CVC care

- Hand decontamination*
 - Fendler et al (2002), Pittet et al (2000)
- Disinfectant/method/ time for CVC hubs*
 - Kaler & Chin (2007), Simmons et al (2011)
- 70% IPA port protection*
 - Sweet et al (2012), Wright et al (2013)
- Prefilled syringes
 - Calop et al (2000), Worthington et al (2010)
- Flushing solution*
 - Mitchell et al (2009), Schallom et al (2012)

*epic3 Loveday et al (2014)

Disinfectant used





Aspects of catheter care

Aspect of catheter care	Number of procedures (%)
Disinfection time/method/dry time*†	3 (8%)
No disinfection time/method/dry time	6 (17%)
Flushing solution	
0.9% sodium chloride for injection*†	21 (60%)
0.9% sodium chloride + heparinised saline	13 (38%)
Heparinised saline only	1 (2%)
Prefilled syringe*	21(60%)
Glove type	
Sterile	29 (83%)
Non sterile†	2 (6%)
Not specified	3 (8%)
None	1 (3%)
Needle-free connector protection	14 (40%)
Gauze & tape	13 (93%)
70% IPA protector*	1 (7%)

* Evidence-based

† Supported by national practice guidelines

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Measuring disinfection time

- 120 raters (40 nurses, 40 non clinical staff & 40 doctors) were timed disinfecting the hub of a dummy CVC on 15 consecutive occasions
- 3 sets of instructions
 - Clean thoroughly
 - Clean for 15 secs
 - Clean for 30 secs

	Clean thoroughly (seconds)			Clean for 15 seconds (seconds)			Clean for 30 seconds (seconds)		
	Nurses	Non clinical	Doctors	Nurses	Non clinical	Doctors	Nurses	Non clinical	Doctors
Mean	17.2	17.4	22.1	14.9	14.2	15.7	29.1	28.6	31.7
Min	1.9	2.1	2.9	3	4.4	7.2	4.6	10.8	15.9
Max	72	75.5	89	31.7	40.5	27.6	59.4	49.3	63
Median	13.8	11.5	16.5	14.9	13.3	15.5	30	27.7	30.2
Analysis of variance	F=1.3, p=0.27			F=0.9, p=0.38			F=1.4, p=0.25		

There was less variation in disinfection time when raters were given a specific instruction, however most raters were not able to gauge time accurately and consistently suggesting the need for disinfection to be formally timed

70% IPA port protection

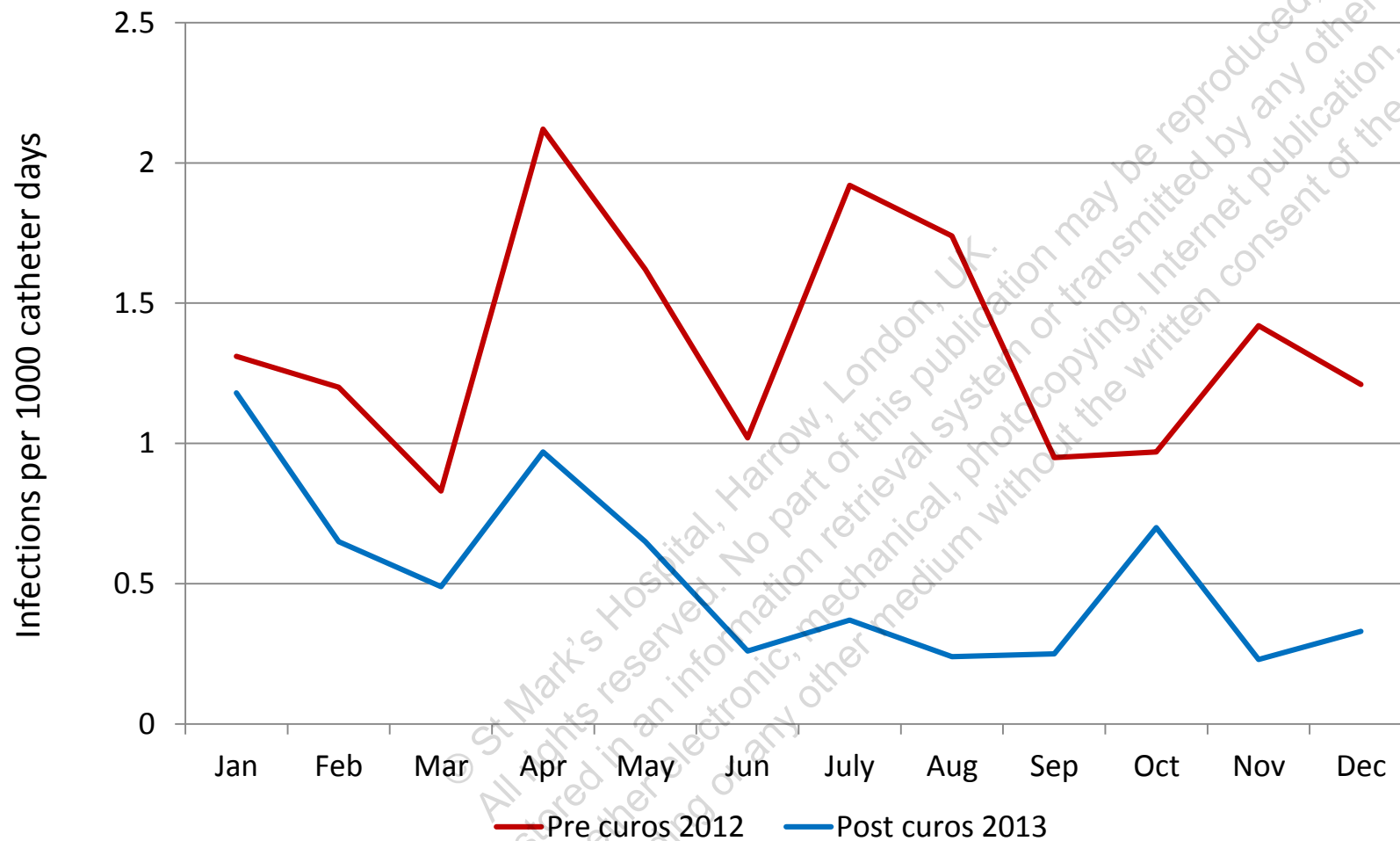
- Single use protective cover with 70% isopropyl alcohol foam disc
 - Provides continuous passive disinfection, *plus* a physical barrier to cross contamination
- Initial studies promising in reducing CRBSI^{1,2}
 - ?if superior to active disinfection
 - ?if equally effective on all brands of needlefree connector
 - ?if all brands equally effective

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¹Sweet et al, *AJIC* 2012; **40**(10): 931-934

²Wright et al, *AJIC* 2013; **41**(1): 33-38

Results



1.21 - 2.12 per 1000 catheter days,
(mean 1.36
median 1.26)

0.23 - 1.18 per 1000
catheter days (mean 0.47
median 0.43)

$p < 0.001$

How can the efficacy of an aseptic technique be assessed?

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Catheter related infection

- Monitoring catheter related infection is an important outcome measure
- Differences in classifying infection
 - Specifically catheter *related* bloodstream infection (CRBSI) & central line *associated* bloodstream infection (CLABSI)
- Availability of culturing methods, & whether catheter tips are available for analysis make direct comparison of infection rates difficult

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Diagnostic challenges

- Infection should be diagnosed according to current guidelines
 - Grade of evidence: very low¹
- Infection rates vary on which definition used
 - 2.1% - 36.8%²
- Blood culture contamination
 - Up to 17% samples contaminated³

¹ESPEN Guidelines on chronic IF in adults, *Clin Nutr* 2016, **35**, 247-307

²Austin et al, *Journal of Hospital Infection*, 2016, **93**(2), 197-205

³Altindis et al, *Jundishapur J Microbiol* 2015, **9**(1), 1-6



Assessing inter rater reliability

- Infection data for a calendar year were reviewed by 24 raters to assess for variation & agreement with original classification of CRBSI, CLABSI & non systemic infection¹
- 12 raters classified the data on 2 occasions (test-retest)²

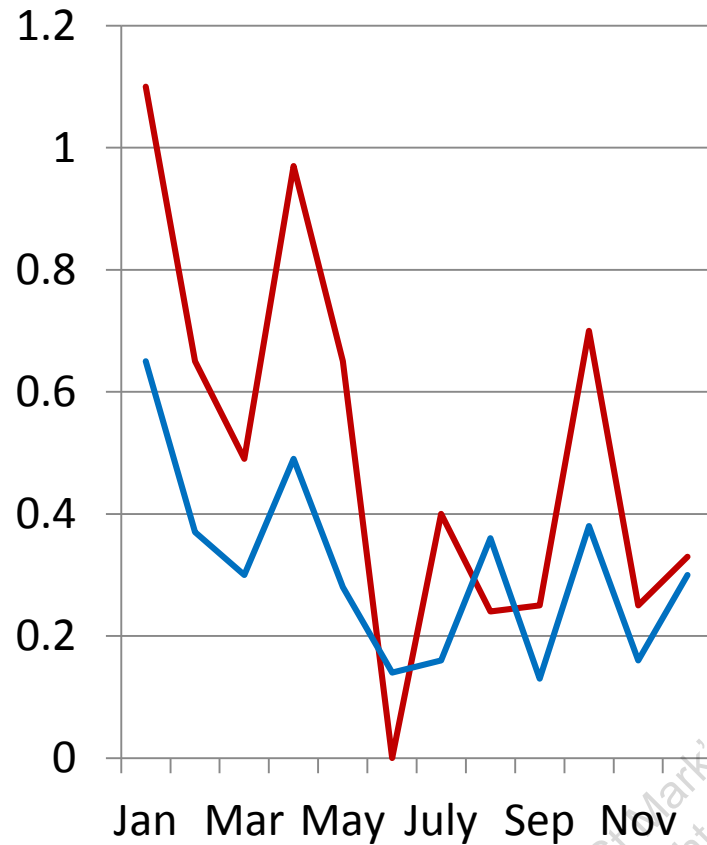
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¹Small et al (2014) BAPEN Abstract

²Small et al (2014). BAPEN Abstract

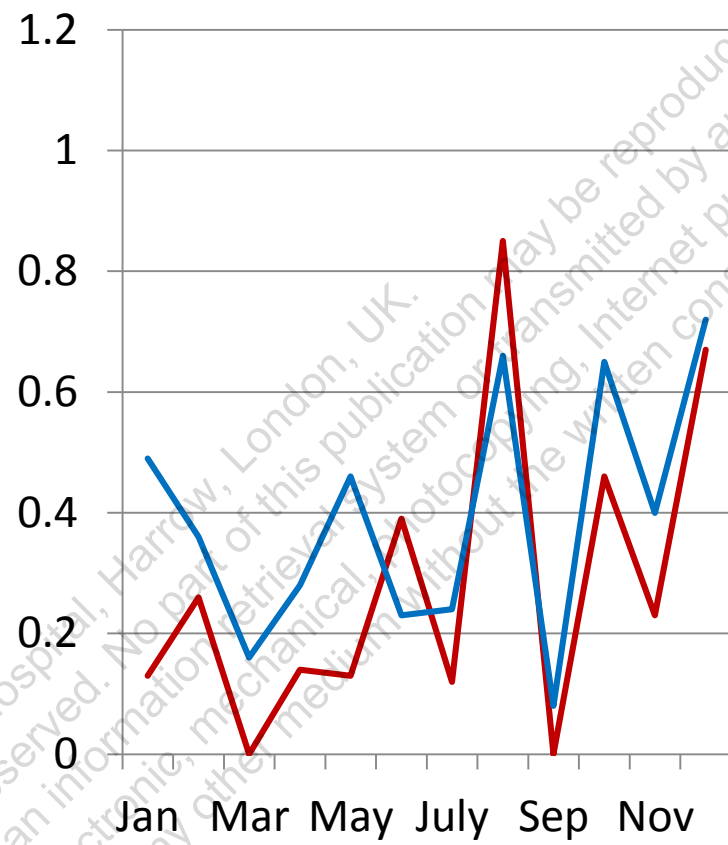


CRBSI



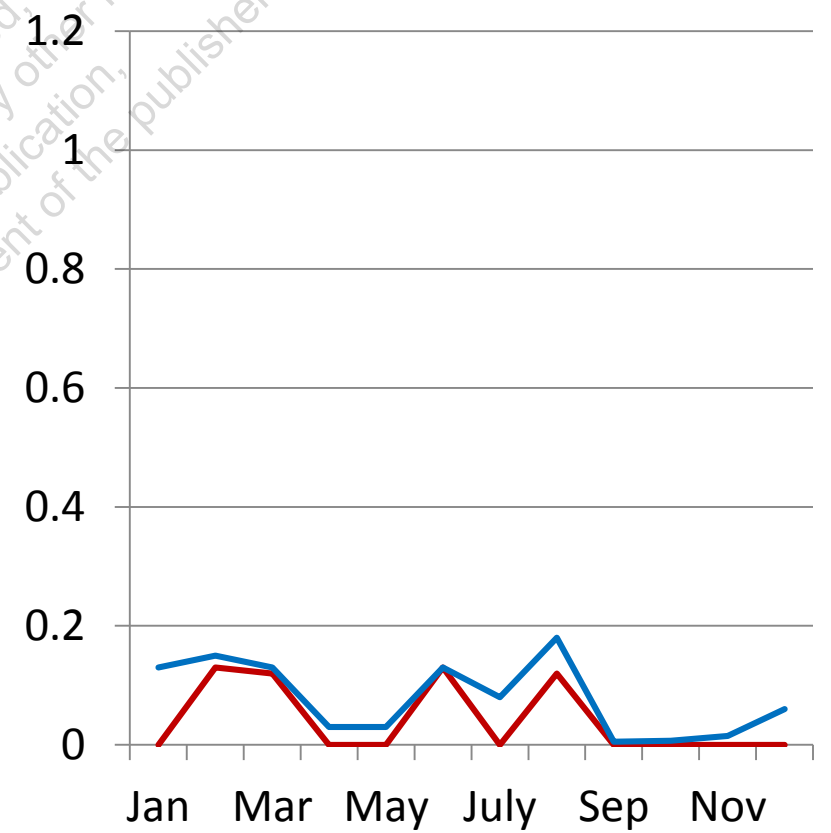
t=3.27, p=0.007

CLABSI



t=2.39, p=0.04

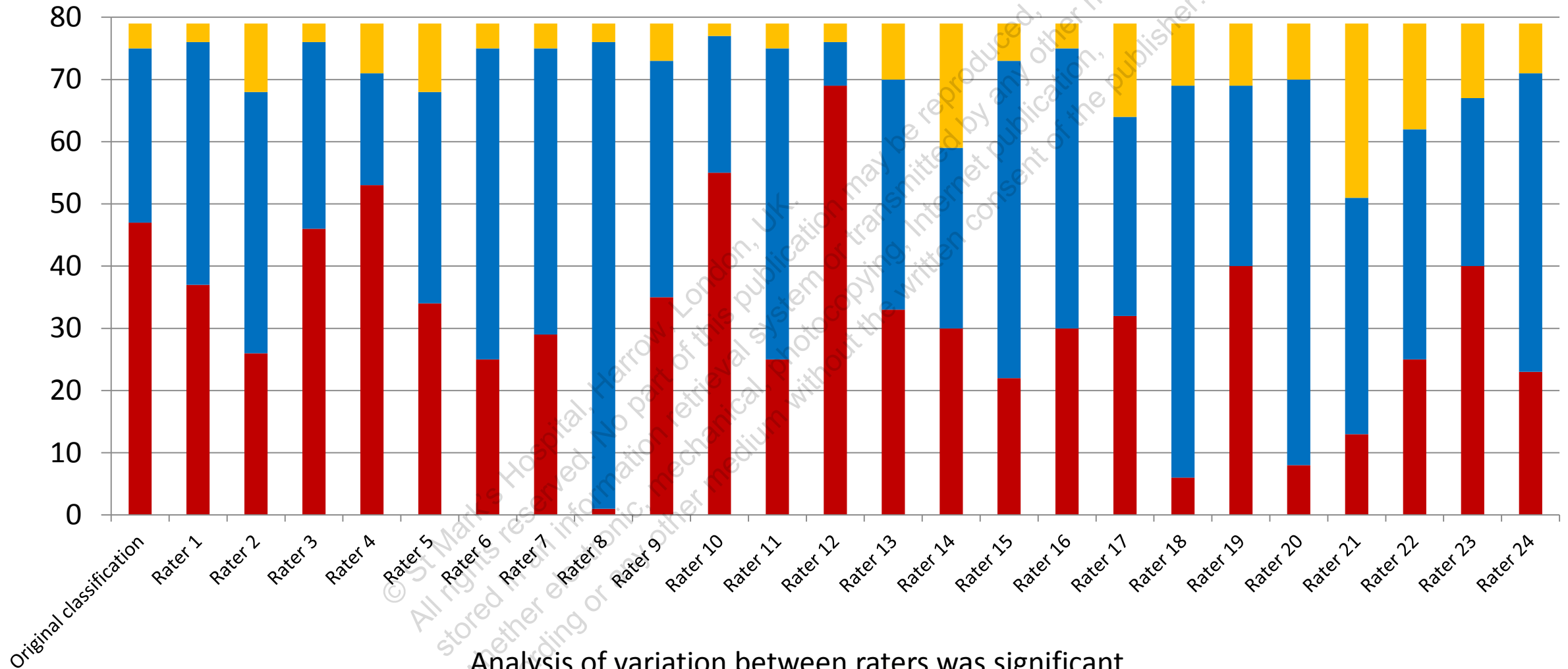
Non systemic



t=3.27, p=0.007

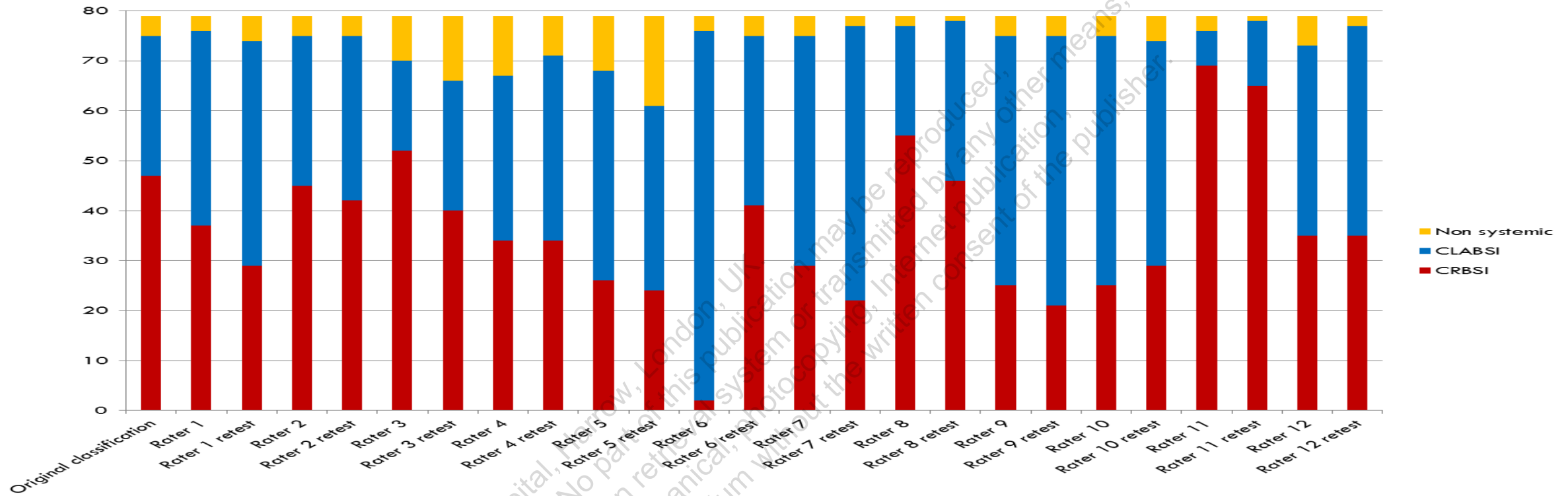
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Results



Analysis of variation between raters was significant

CRBSI, $F=5.79$, $p<0.0001$, CLABSI $F=4.17$, $p<0.0001$, and non systemic $F=3.6$, $p<0.0001$



Rater	1	2	3	4	5	6	7	8	9	10	11	12
Answers in agreement	59	49	53	50	66	36	57	61	65	67	62	61
% matched answers	75%	62%	67%	63%	83%	46%	72%	77%	82%	85%	78%	77%



Summary & recommendations

- Focus on the principles of asepsis rather than a step by step list of instructions
- Hospitals should incorporate evidence based recommendations into their procedures
- There is a need for a standardised approach to determining catheter related infection

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