Health Economic Benefits of Chlorhexidine Gluconate Dressings

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Estimates of economic outcomes in CR-BSI

Author, year	n	Excess ICU stay (d.)	Excess hospital stay (d.)	Excess cost
Warren D, 2006	41	2.4	7.5	$ 11 971
Higuera F, 2007	55	6.1	-	$ 11 591
Blot S, 2005	176	8	12	€ 13 858
Schwebel C, 2012	1636	11	-	$ 24 090 (~€ 18.000)

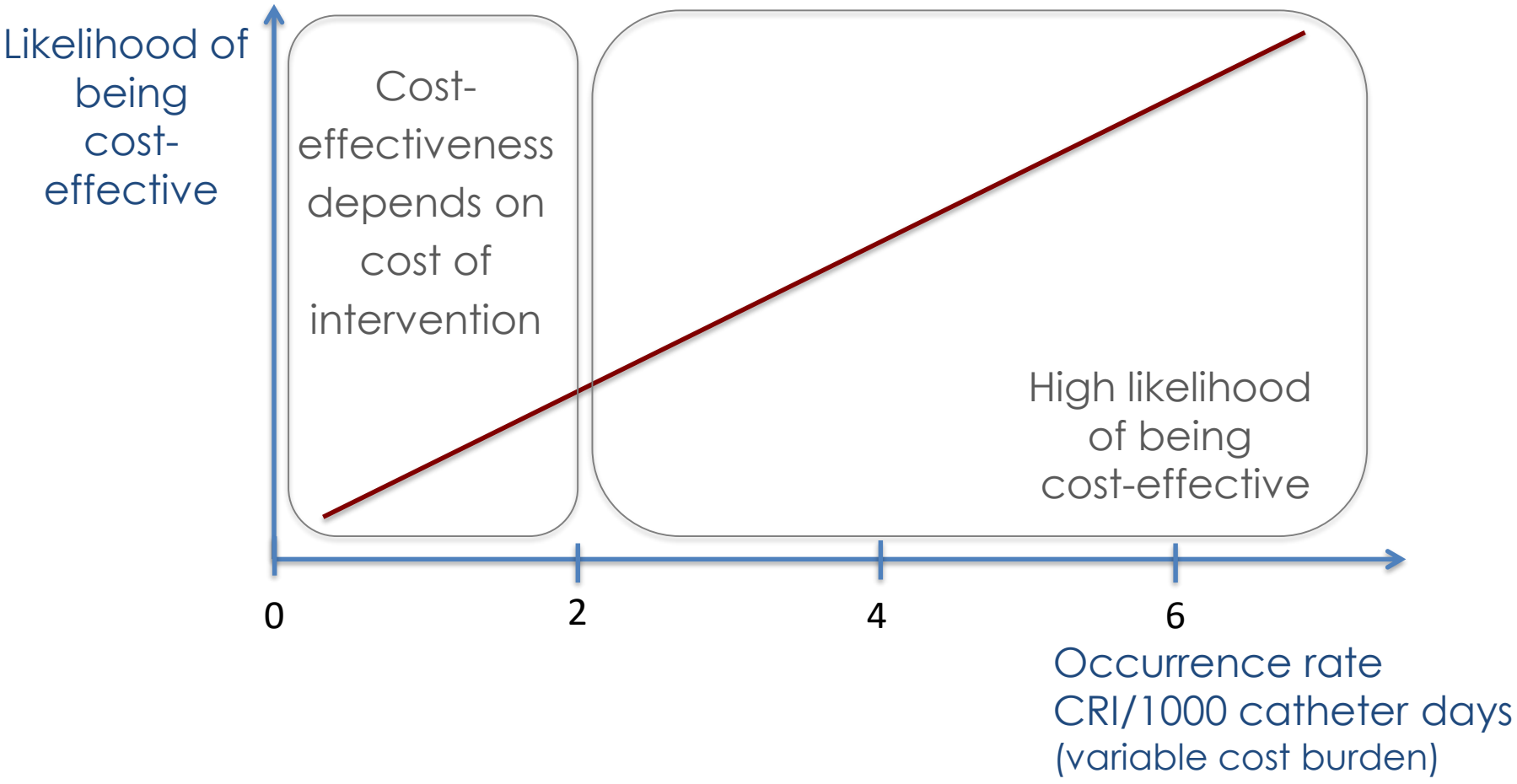
Excess cost is mainly driven by excess length of stay

Essentials of Cost-Effectiveness

- Innovation is expensive
- Partially reflected in prize/unit on the market
- Cost-effectiveness (cost of investment < cost savings) depends on:
    - Prize / unit
    - Consumption of units
    - Cost of the infection
    - Number of infections that will be avoided
        ~ Baseline infection rate (➔ preventable portion)

Cost-effective prevention of CR-BSI

Potential of cost-effectiveness depends on occurrence rate (number of cases to be prevented).



Chlorhexidine-Impregnated Sponges and Less Frequent Dressing Changes for Prevention of Catheter-Related Infections in Critically Ill Adults

A Randomized Controlled Trial

	CHG-impregnated sponges	Control dressing	HR (95% CI)
Major CRI	10/1953 (0.5%) 0.6 / 1000 cath. days	19/1825 (1.1%) 1.4 / 1000 cath. days	0.39 (0.17 – 0.93)
CR-BSI	6 /1953 (0.3%) 0.4 / 1000 cath. days	17/1825 (0.9%) 1.3 / 1000 cath. days	0.24 (0.09 – 0.65)

- **Dressing changes /7 days not inferior to /3 days (!)**

Timsit JF, et al. JAMA 2009

Dressing disruption is a major risk factor for catheter-related infections*

- Secondary analysis of RCT
- Risk of CRI increased with number of dressing disruptions:
  - 1st disruption: HR 1.9 (95% CI, 0.5 – 7.5)
  - 2nd disruption: HR 3.3 (95% CI, 1.2 – 9.0)
  - 3rd disruption: HR 12.5 (95% CI, 4.0 – 39.6)

Timsit JF, et al. Crit Care Med 2012

Current insights

- Continuous exposure of CHG at the insertion site reduces the risk of CRI
- Dressing changes /7 days is not inferior to /3 days
- Dressing disruption is a risk factor for CRI

Remaining issues…

- Practical issues with manipulating sponge
- Impossible to inspect insertion site of the catheter without dressing removal
- Effectiveness of highly adhesive dressing unresolved

Randomized Controlled Trial of CHG-Dressing and Highly Adhesive Dressing for Preventing Catheter-Related Infections in ICU Patients

Study Methods

- Assessor blinded randomized trial
- Patients with expected catheterization of > 48 hours
- 12 French ICU's

Timsit JF, et al. Am J Respir Crit Care Med 2012

Randomized Controlled Trial of CHG-Dressing and Highly Adhesive Dressing for Preventing Catheter-Related Infections in ICU Patients

Study Methods: 3 study groups:

(1) Tegaderm CHG

- Chlorhexidine-gluconate dressing
- Only dressing available combining transparency and CHG
- 50% of patients

(2) Tegaderm HP

- highly adhesive dressing
- 25% of patients

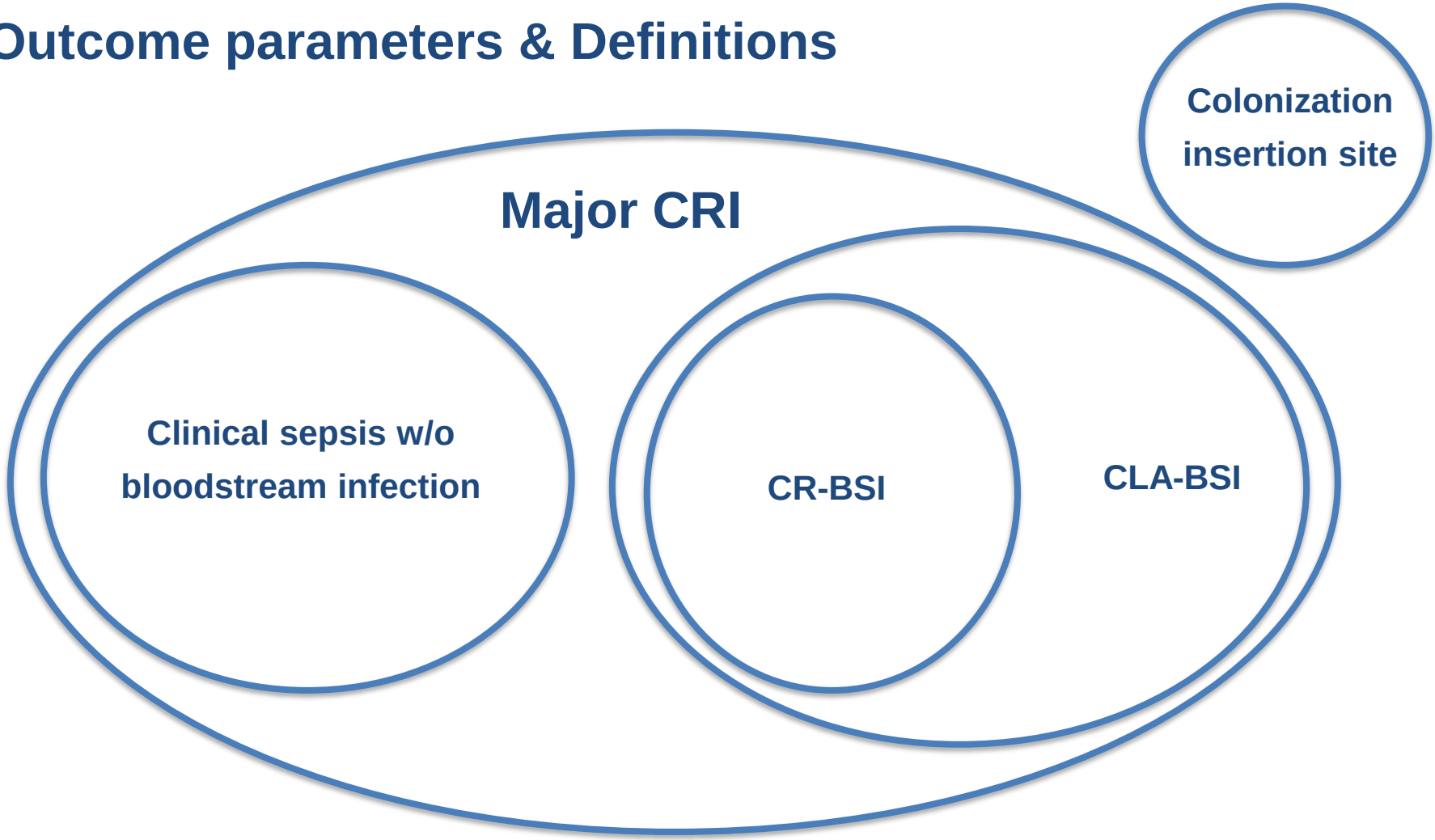
(3) Tegaderm IV

- standard dressing
- 25% of patients

Timsit JF, et al. Am J Respir Crit Care Med 2012

Randomized Controlled Trial of CHX-Dressing and Highly Adhesive Dressing for Preventing Catheter-Related Infections in ICU Patients

Outcome parameters & Definitions

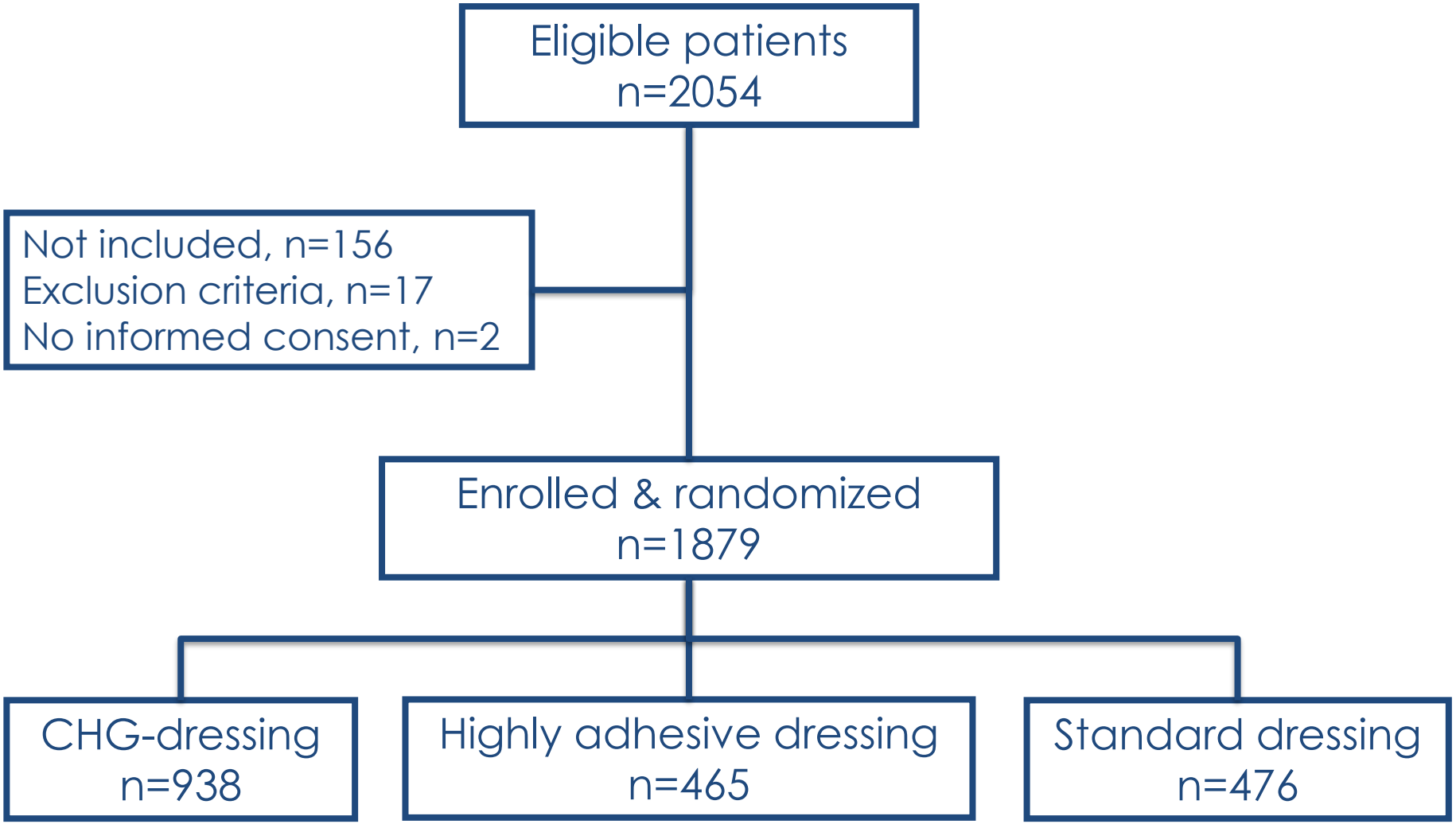


Primary endpoints

- Major CRI rate for CHG- *vs*. non-CHG-dressings

- Catheter colonization rate for highly adhesive dressing (non-CHG) *vs*. standard dressings (non-CHG)

Study Flow Chart



Results

ITT population
1879 patients; 4163 catheters

CHG-dressings	High adhesive dressings	Standard dressings
75 colon. (4.3/1000 days)	**97 colon. (12.5/1000 days)**	**89 colon. (9.6/1000 days)**
12 major CRI (0.7/1000 days)	15 major CRI (1.9/1000 days)	21 major CRI (2.3/1000 days)
9 CR-BSI (0.5/1000 days)	10 CR-BSI (1.3/1000 days)	12 CR-BSI (1.3/1000 days)

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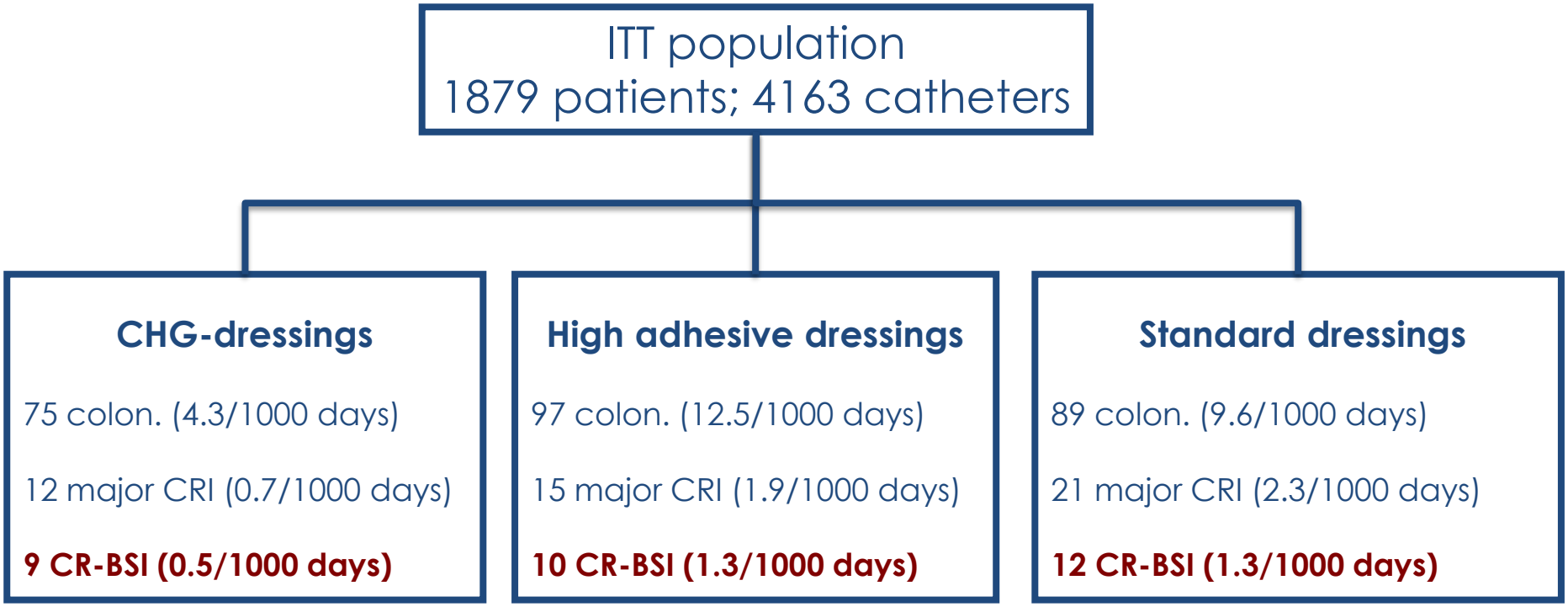
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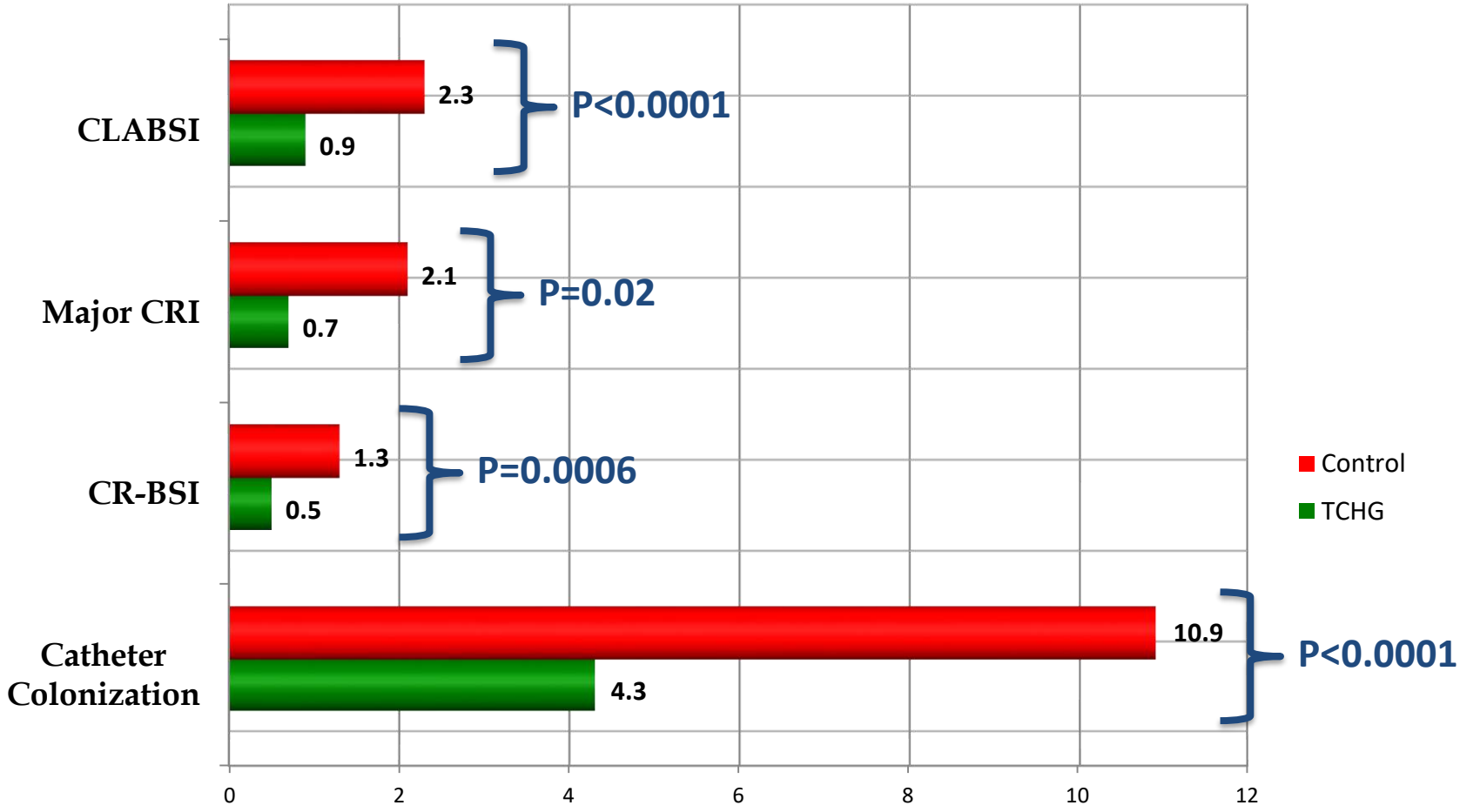
Results: CHG vs. (highly adhesive + control)



	Catheter Colonization	CR-BSI	Major CRI	CLABSI
Control	10.9	1.3	2.1	2.3
TCHG	4.3	0.5	0.7	0.9

Randomized Controlled Trial of CHG-Dressing and Highly Adhesive Dressing for Preventing Catheter-Related Infections in ICU Patients

Conclusion on Tegaderm CHG

- The only dressing available combining transparency and CHG
- Proven to reduce CRI risk
- Cost-effective?

Cost-effectiveness simulation of a CHG-dressing

- **Simulation**
  - 14-bed ICU
  - 1300 admissions / year
  - Average length of catheterization: 5 days
  - CVC-days: 6500 / year

- **Number of dressing changes:**
  - 6500 CVC-days / 7d. = 929
  - 6500 CVC-days / 3d. = 2166

Cost-effectiveness simulation of a CHG-dressing

Type of dressing	Cost/unit	Dressing changes/7d.	Dressing changes/3d.
CHG	€ 6,00	€ 5.574,00 (929 dressing changes × € 6,00)	€ 12.996,00 (2166 dressing changes × € 6,00)
Standard	€ 0,40	€ 371,60 (929 dressing changes × € 0,40)	€ 866,40 (2166 dressing changes × € 0,40)

Cost-effectiveness simulation of a CHG-dressing

CR-BSI occurrence rate in the unit

Standard dressing: 1.3 CR-BSI / 1000 CVC-days ➔ **8.45** CR-BSI / y

CHG-dressing: 0.5 CR-BSI / 1000 CVC-days ➔ **3.25** CR-BSI / y

Cost-effectiveness simulation of a CHG-dressing

CR-BSI occurrence rate in the unit

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0.5 CR-BSI / 1000 CVC-days ➔ **3.25** CR-BSI / y

	Cost / CR-BSI	
	€ 18.000	
CR-BSI rate	1.3/1000	
Total CR-BSI cost (€)	152.100	
Investments (€)	866	
Total cost (€)	152.966	

Cost-effectiveness simulation of a CHG-dressing

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	Cost / CR-BSI	
	€ 18.000	
CR-BSI rate	1.3/1000	0.5/1000
Total CR-BSI cost (€)	152.100	58.500
Investments (€)	866	12.996
Total cost (€)	152.966	71.466

Cost-effectiveness simulation of a CHG-dressing

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Total cost (€)	152.966	71.466
Cost savings (€)	**81.500**	

Cost-effectiveness simulation of a CHG-dressing

CR-BSI occurrence rate in the unit

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	Cost / CR-BSI			
	€ 18.000		€ 13.500	
CR-BSI rate	1.3/1000	0.5/1000	1.3/1000	0.5/1000
Total CR-BSI cost (€)	152.100	58.500	114.075	43.875
Investments (€)	866	12.996	866	12.996
Total cost (€)	152.966	71.466	114.941	56.841
Cost savings (€)	81.500		58.100	

Cost-effectiveness simulation of a CHG-dressing

CR-BSI occurrence rate in the unit

1.3 CR-BSI / 1000 CVC-days ➔ **8.45** CR-BSI / y

0.5 CR-BSI / 1000 CVC-days ➔ **3.25** CR-BSI / y

	Cost / CR-BSI					
	€ 18.000		**€ 13.500**		**€ 6.000**	
CR-BSI rate	1.3/1000	0.5/1000	1.3/1000	0.5/1000	1.3/1000	0.5/1000
Total CR-BSI cost (€)	152.100	58.500	114.075	43.875	50.700	19.500
Investments (€)	866	12.996	866	12.996	866	12.996
Total cost (€)	152.966	71.466	114.941	56.841	51.566	32.496
Cost savings (€)	**81.500**		**58.100**		**19.070**	

Cost-effectiveness simulation of a CHG-dressing

- Simulation starts from the assumption that current CR-BSI rate is (only) 1.3 / 1000 CVC days!!
- The average CR-BSI rate is estimated 3-5 / 1000 CVC days

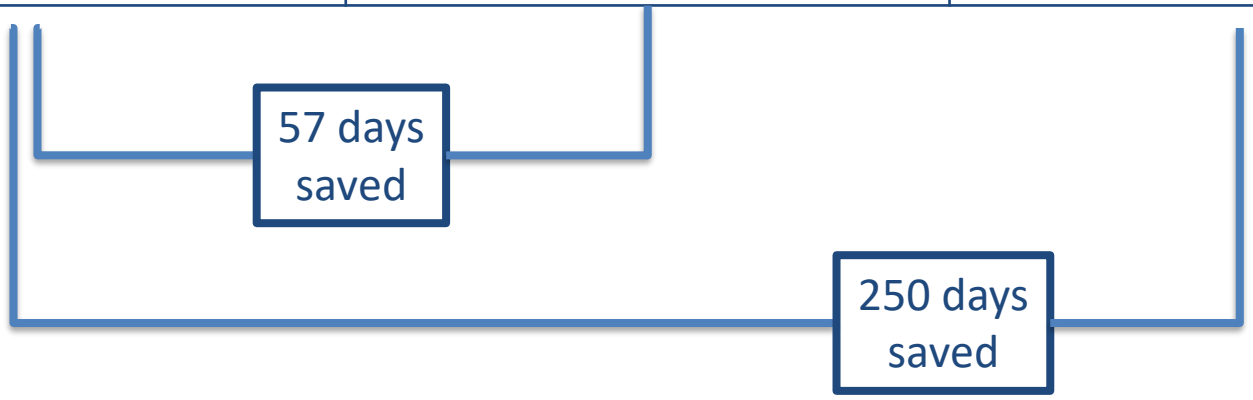
	Cost / CR-BSI					
	€ 18.000		€ 13.500		€ 6.000	
CR-BSI rate	**4.0/1000**	0.5/1000	**4.0/1000**	0.5/1000	**4.0/1000**	0.5/1000
Total CR-BSI cost (€)	468.000	58.500	351.000	43.875	156.00	19.500
Investments (€)	866	12.996	866	12.996	866	12.996
Total cost (€)	468.866	71.466	351.866	56.841	156.866	32.496
Cost savings (€)	**397.400**		**295.025**		**124.370**	

Cost-effectiveness simulation of a CHG-dressing

- Effect in terms of saved hospitalization days…

  Average added length of stay: **11 days**

0.5 / 1000 CVC days	**1.3 / 1000 CVC days**	**4 / 1000 CVC days**
(3.25 CR-BSI / y) x (11 days)	(8.45 CR-BSI / y) x (11 days)	(26 CR-BSI / y) x (11 days)
36 days	93 days	286 days



Conclusion

- CR-BSI is associated with significant morbidity and cost
- CR-BSI is highly preventable
- Tegaderm CHG:
  - combines transparency & CHG
  - significantly reduce the risk of CR-BSI
  - CHG-dressings are highly cost-effective