Infections related to buttonhole cannulation in a satellite dialysis unit

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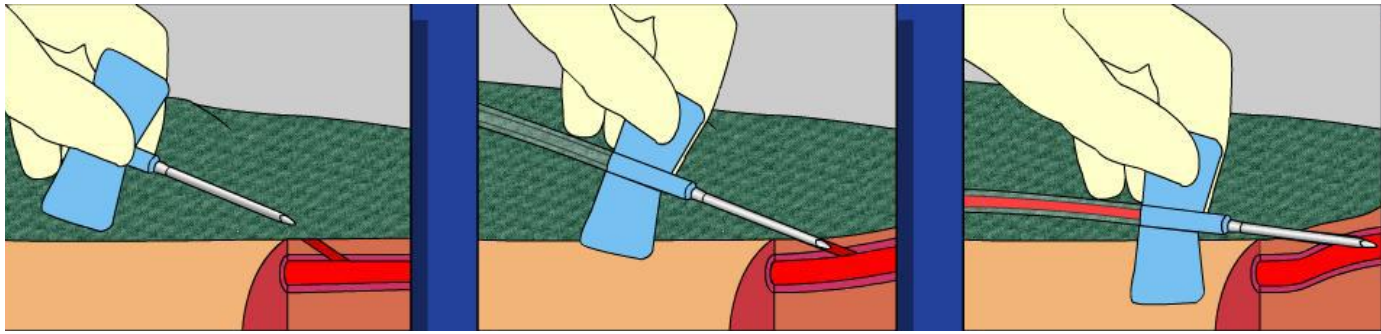
Buttonhole cannulation

- First description in 1977 (Twardowski)
- Use of blund needle
- « constant-site » technique ≠ « rope-ladder » technique

- 2 steps:
  - Track creation
  - Buttonhole cannulation



Advantage and inconvenience of buttonhole needling

- Advantages:
  - Anevrysm

    Marticorena, Hemodial Int 2006
    Vaux, Am J Kidney Dis 2013
  - Hematoma

    MacRae, Clin J Am Soc Nephrol 2012
  - Interventions

    Vaux, Am J Kidney Dis 2013
    Van Loon, Nephrol Dial Transplant 2010
  - Bad sticks

    Verhallen, Nephrol Dial Transplant 2007

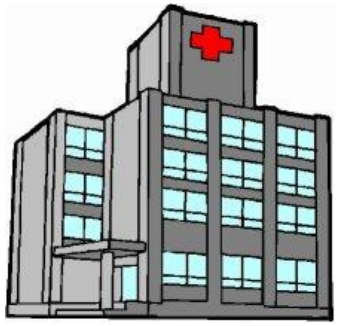
- Disadvantage:
  - AVF-related infection?

Reasons

- Incomplete scab removal
- Nonadherence to hygienic rules
- Damages of the track

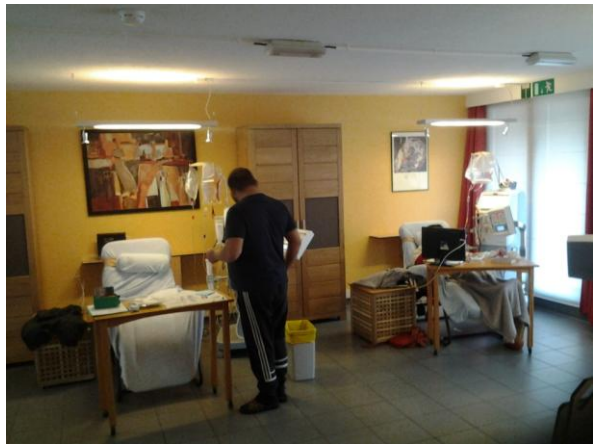
Satellite dialysis unit

- Particularities of satellite dialysis unit
  - Patient
  - Medical team
  - Less colonisation than in hospital ?



- Access related complications and hospitalisation
  - Major cause of fallback

    Lindsay, Clin J Am Soc Nephrol 2009



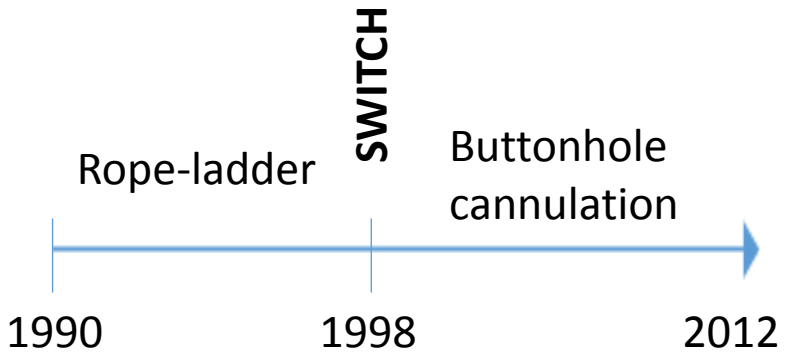
Aim of the study

- Incidence rate of AVF-related infections in satellite dialysis unit
- Are there more AVF-related infections with buttonhole cannulation than with rope-ladder?

How to answer this question??

Population and events

- Inclusion criteria
  - All patients having dialysis session in « Carpe Diem »
  - Between 1990 and 2012
  - With functionning AVF



- Events of interest
  - Local infection
  - Bacteriemia
  - Combined infection

Study population

- Characteristics

	1st period	2nd period
Number of patients	68	115
Number of AVF-days	57851	97911
Age (y)	45,8 (20,4)	46,9 (20,4)
Men	39 (57,3)	70 (60,9)
Underlying nephropathy		
Diabetic	1 (1,5)	9 (8,0)
Glomerulonephritis	21 (31,8)	44 (39,2)
Vascular	4 (6,1)	8 (7,1)
Polycystic kidney disease	15 (22,7)	22 (19,6)
Uropathy	1 (1,5)	3 (2,7)
Chronic interstitial nephritis	17 (25,8)	13 (11,6)
Other nephropathy	7 (10,6)	13 (11,6)
Diabetes	2 (2,99)	11 (9,8)
Transplantation before HD initiation	10 (14,7)	18 (15,8)
Immunosuppressive therapy at HD initiation	14 (20,6)	24 (21,0)

Values expressed as mean (IQR) or number (rate)

Incidence of infections

Infectious event	1st period	2nd period
Local infection (alone)		
number	2	7
incidence rate (per 1000 AVF-days)	0,03	0,07
Bacteremia (alone)		
number	0	2
incidence rate	0	0,02
Combined local infection and bacteremia		
number	1	4
incidence rate	0,02	0,04
All infections		
number	3	13
incidence rate	0,05	0,13

Incidence rate expressed for 1000 AVF-days

Comparison of incidence?

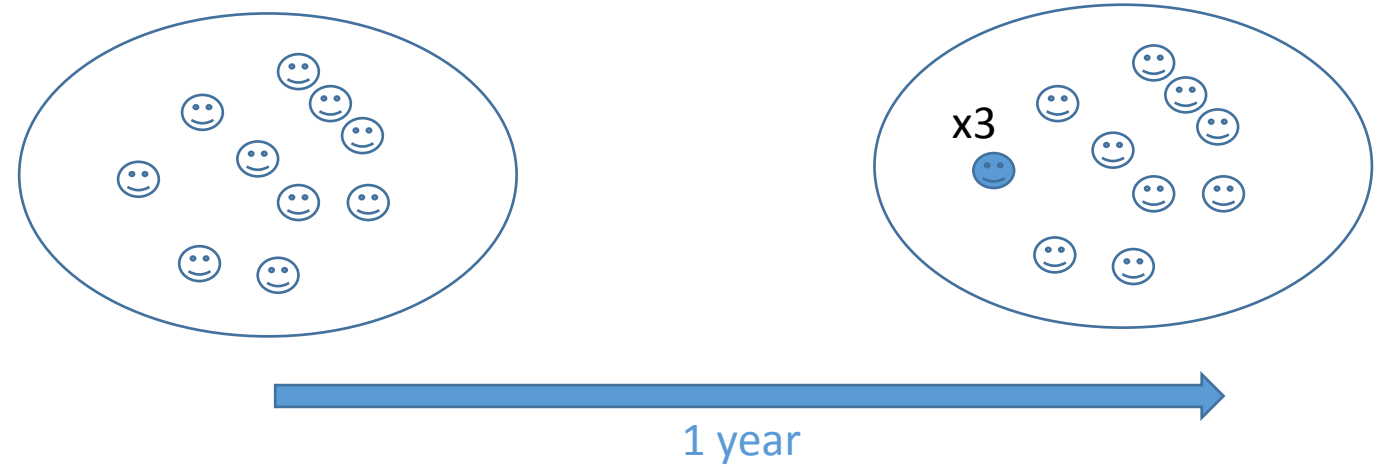
Exact Fisher test:
p=0,44

Ratio?

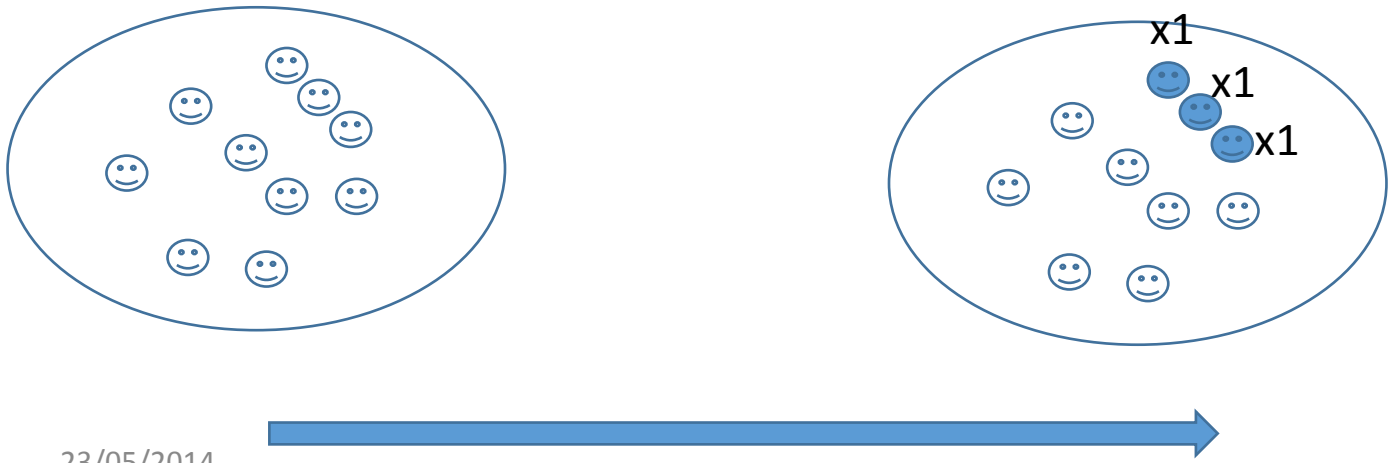
Incidence rate ratio

Incidence

Number of new cases over a period of time: IR = $\frac{n}{PY}$



$\frac{3}{10}$



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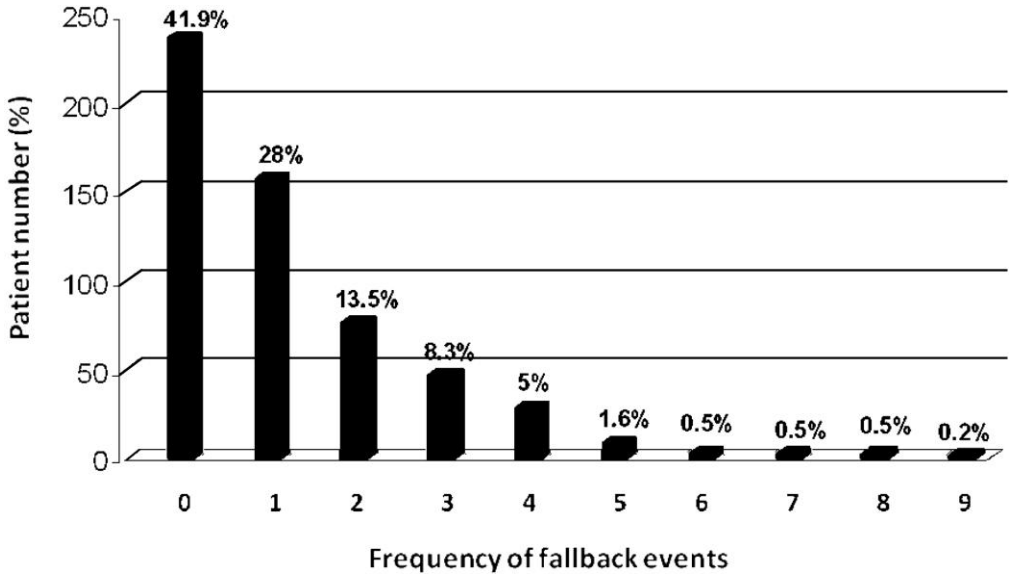
Infection per patient

Statistical analyses

Poisson regression?

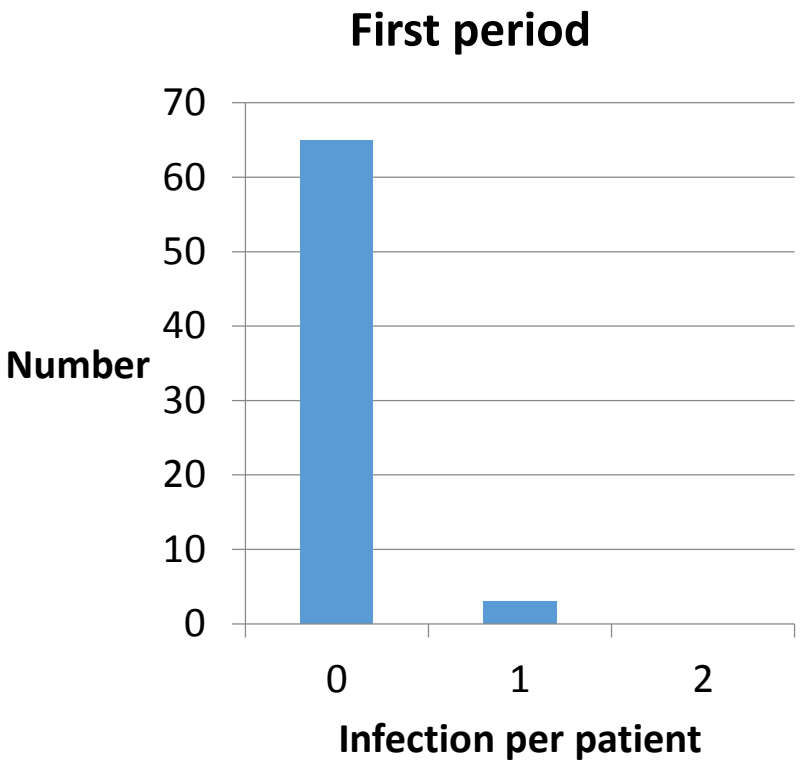
Regression analysis used to model count data

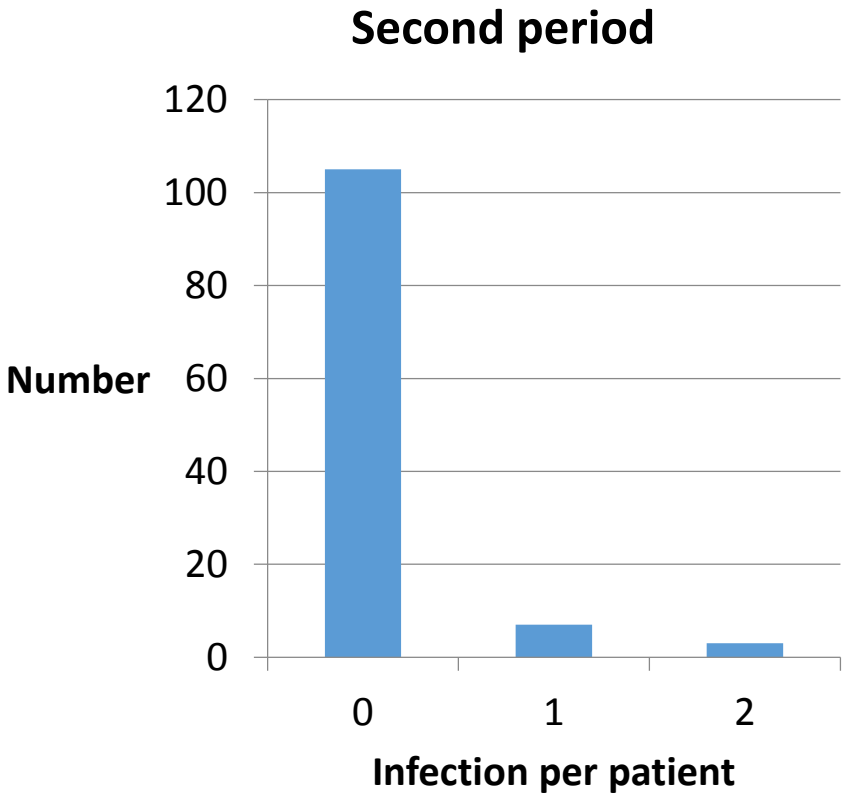
Rare event



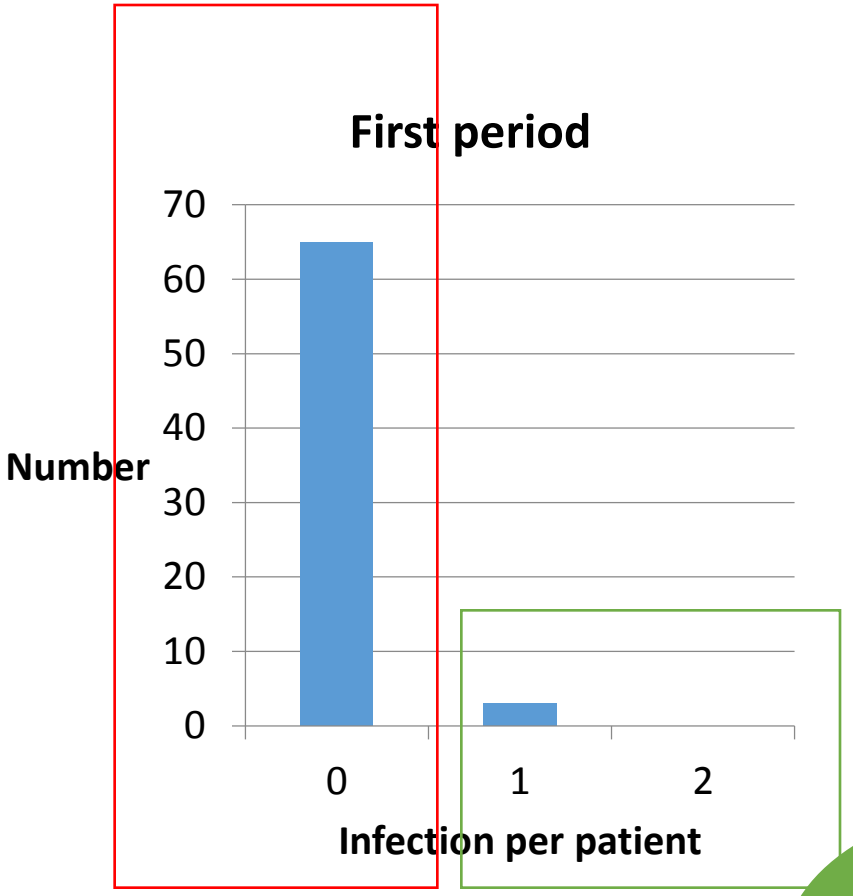
Lindsay, Clin J Am Soc Nephrol 2009

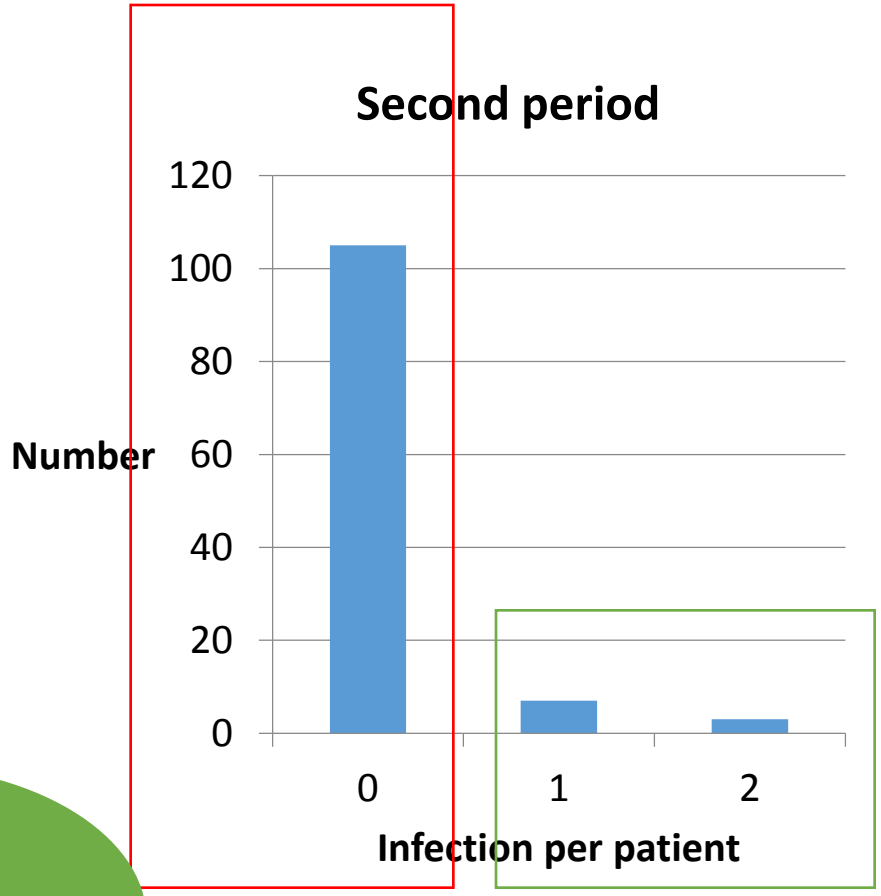
AVF-related infection per patient





Infection per patient





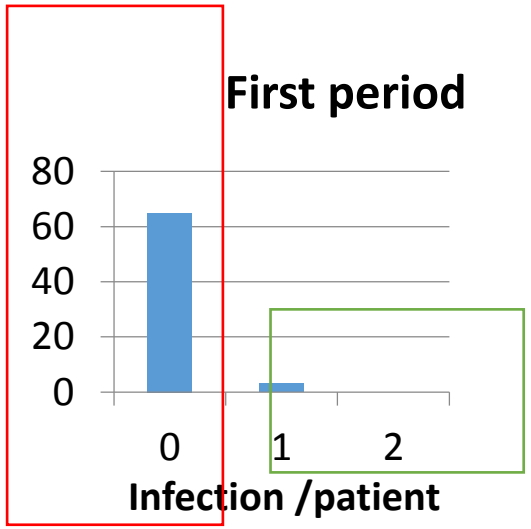
ZIP model

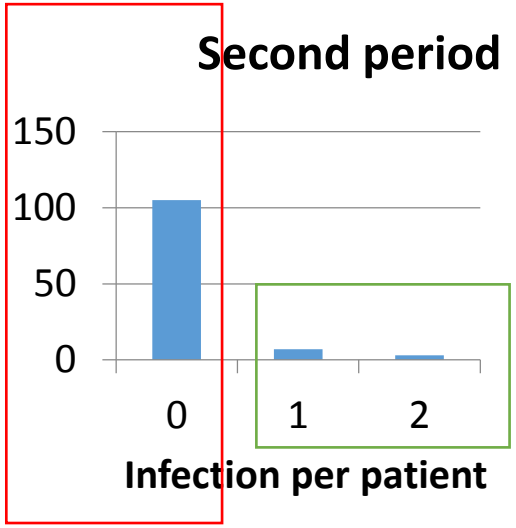
Bivariate analysis

Zero-inflated Poisson regression for the total number of infections per patient

Variable	Estimate	P value
Buttonhole cannulation		
Excess zero coefficient	7,39	0,9
Count model coefficient	2,52	0,02

...95%CI (2,48 to 62,28)





Conclusion

- Rare event in this population: 0.13 events /1000AVF-da

- Patient at risk more than technique at risk

Buttonhole and satellite dialysis unit

- Low-care dialysis unit compared to in-center dialysis
  - Self cannulation
  - Less comorbidites
- Nurses' supervision compared to home hemodialysis
  - Hygienic rules
  - Relationship between medical staff and patient

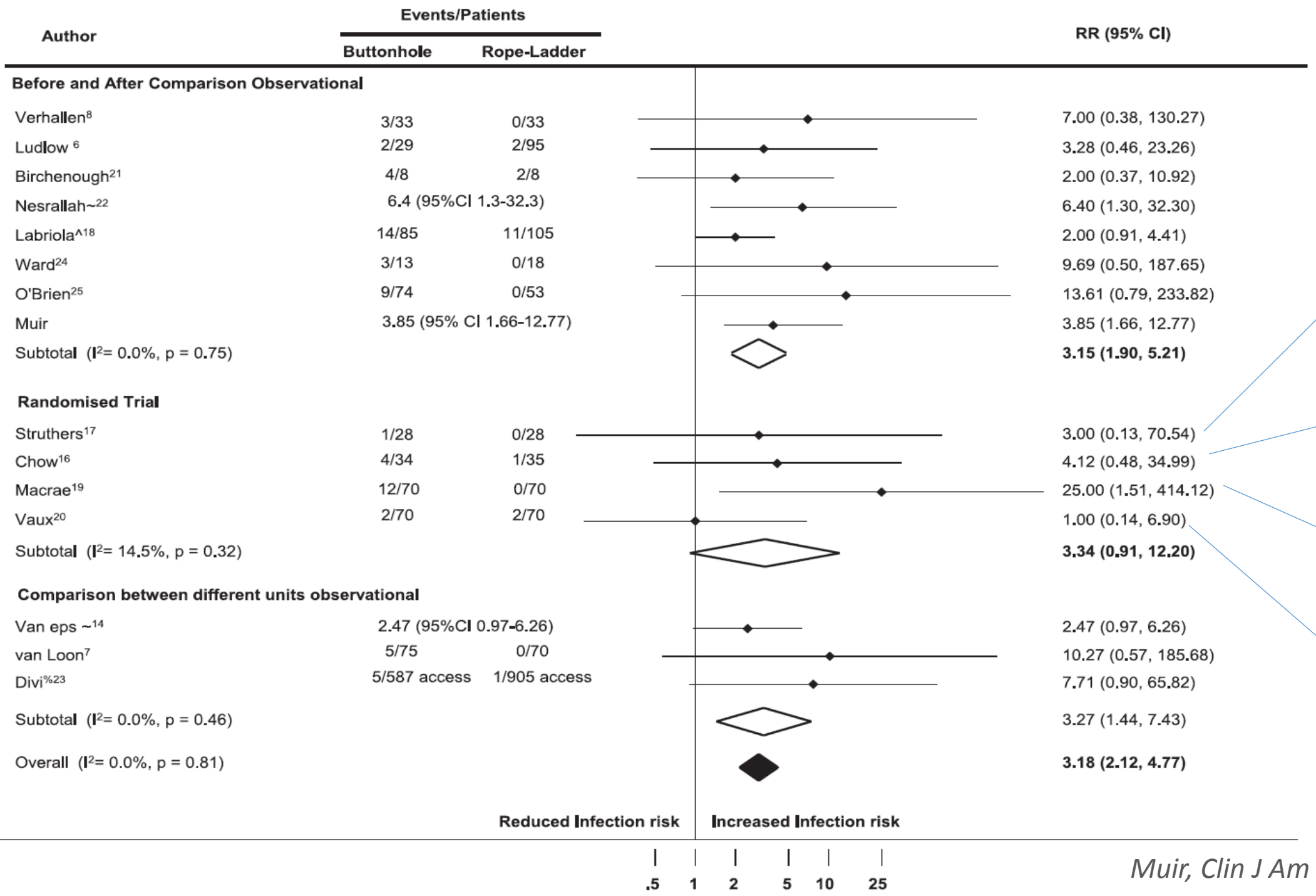
    Diamant, Clin J Am Soc Nephrol 2011
- Appropriate for satellite dialysis unit
  - Vascular-access survival

    Vaux, Am J Kidney Dis 2013
  - Infection= rare event

Scab removal
Number of disinfections
Contact time of the disinfectant

Discussion

Bedankt



In center + satellite units
56p
6m follow-up

In center HD
60p
6m follow-up

In center HD
140p
1y follow-up

In center HD
140p
1y follow-up

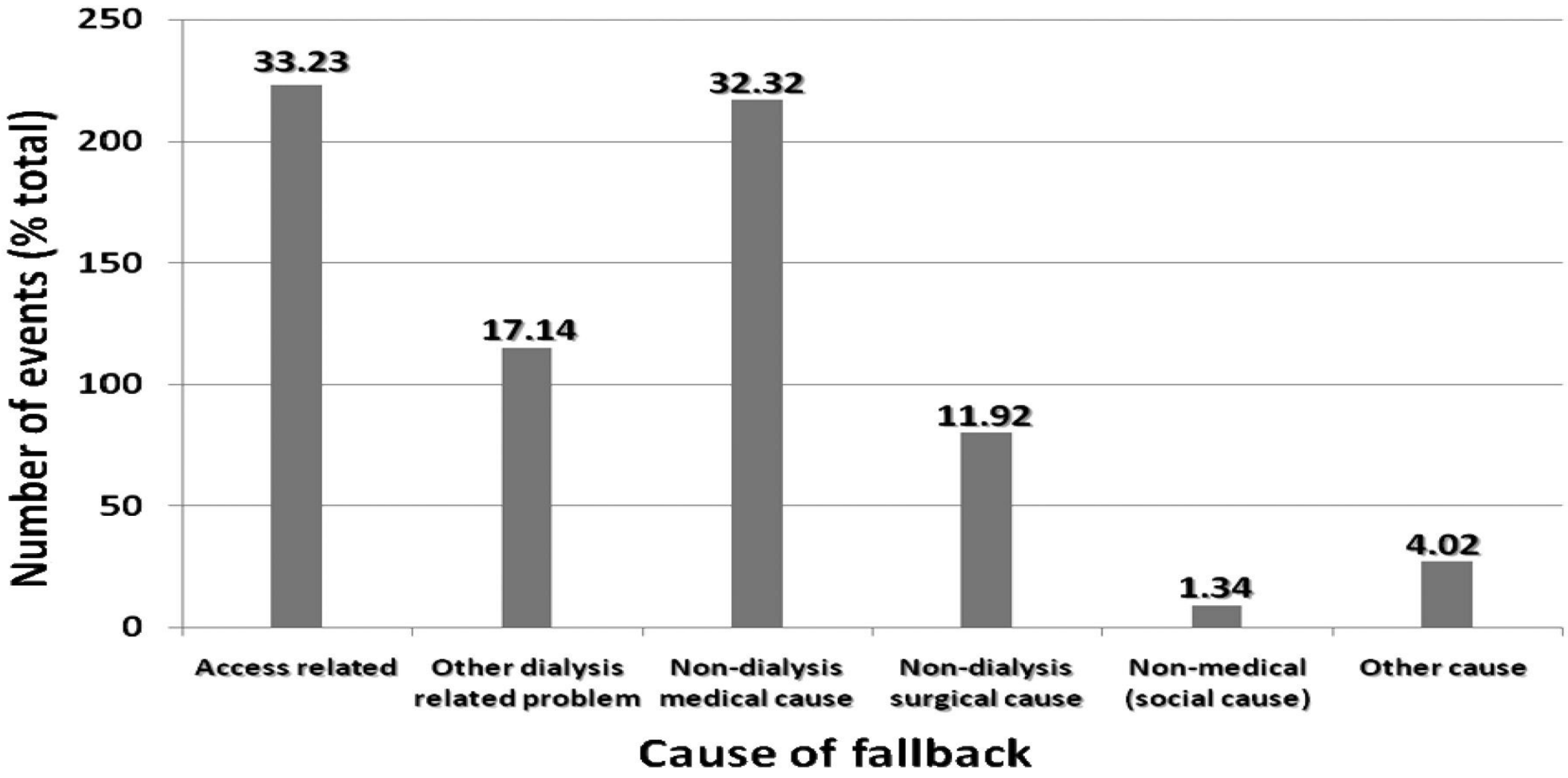
Muir, Clin J Am Soc Nephrol 2014

- Modèle de Poisson

$$P(Y = k) = e^{-\lambda} \frac{\lambda^k}{k!}$$

$$Log(Y) = \propto + \beta_1 * X$$

Primary causes of fallbacks.



Lindsay R M et al. CJASN 2009;4:603-608

CJASN

Discussion

- Other events
  - Period 1:
    - 1 AVF surgery
    - 1 septic metastasis (lung)
  - Period2:
    - 1 septic metastasis (bone)
- Micro-organisms
  - 6 MSSA
  - 1 Staph epidermidis