

# Is 4% Citrate an effective tool as a catheter locking solution?

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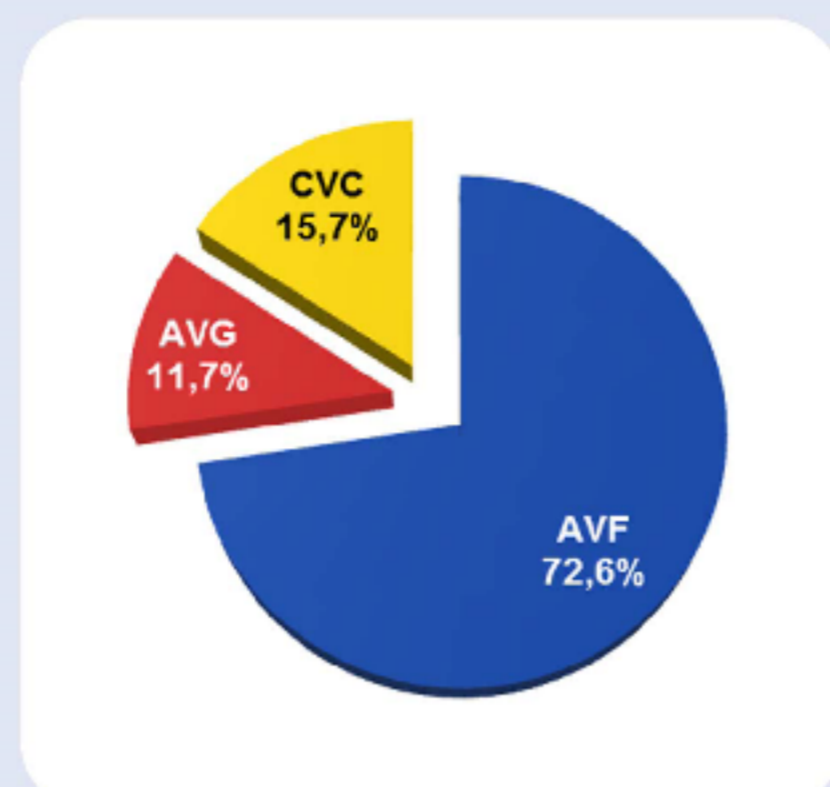
## Introduction

Despite the arteriovenous fistula being the preferable vascular access for haemodialysis (HD), we face the need to use central venous catheters<sup>1</sup>.

Currently there are several locking solutions for haemodialysis catheters, from heparin to various concentrations of citrate, among others. Heparin is well known for the experience of its use and effective anticoagulant effect however not recognized for antimicrobial action. The risks associated with its use are bleeding and haematomas, from mild to severe.

Sodium citrate has also become known for both anticoagulant effect and antimicrobial effect, depending on the dosage. Starting on 4% with controversial antimicrobial effect, to 46.7% with high anticoagulant and antimicrobial effect described, but also with high risk associated with its usage<sup>2,3</sup>.

Could the entrance of a new product change our usage habits and reveal new opportunities, as recommended by ERBP and ASDIN position statement?<sup>4</sup>



## Objectives

To assess patient outcomes with the use of 4% citrate with polyhexanide as a preservative (IntraLock®).

To compare with the previous catheter lock solution, either 30% citrate or heparin 5000UI/mL, used in the same population.



Figure 1

## Methods

We performed a retrospective study, with case-control: each patient was the control of himself/herself.

During the study, there were no changes in the procedures regarding instillation of catheter locks (figure 1).

In 36 haemodialysis centres, from a total of 372 patients under chronic HD using 4% citrate as a catheter locking solution, we selected 56 patients with at least 4 months using 4% citrate and also, at least, with 4 months of previous use of another catheter lock.

36 Dialysis Centres

372 patients using 4% citrate

56 patients selected

5819 events analysed

For the comparison, individual analyses were performed per patient and per treatment in a total of 5819 events regarding >38 catheter-years.

## Conclusions

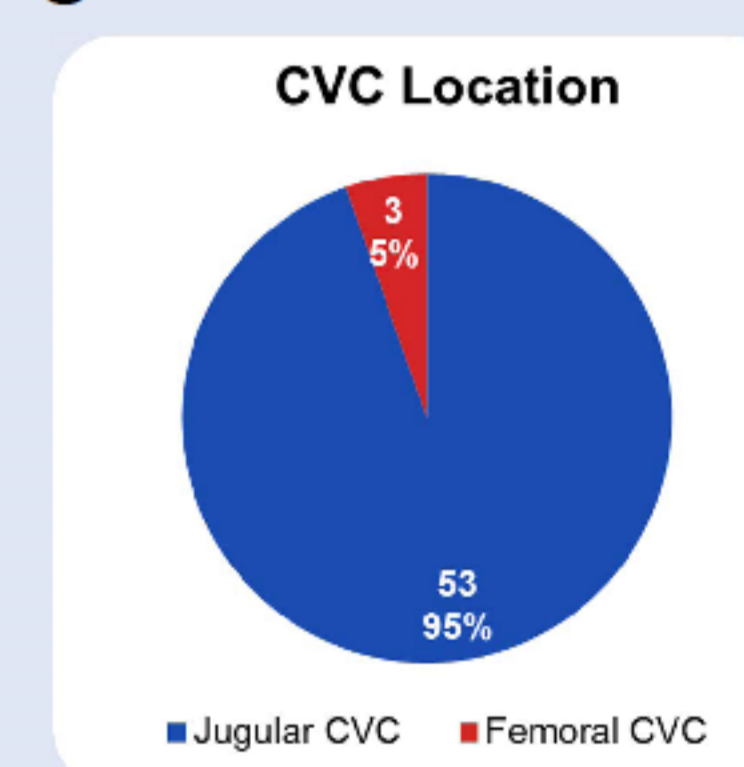
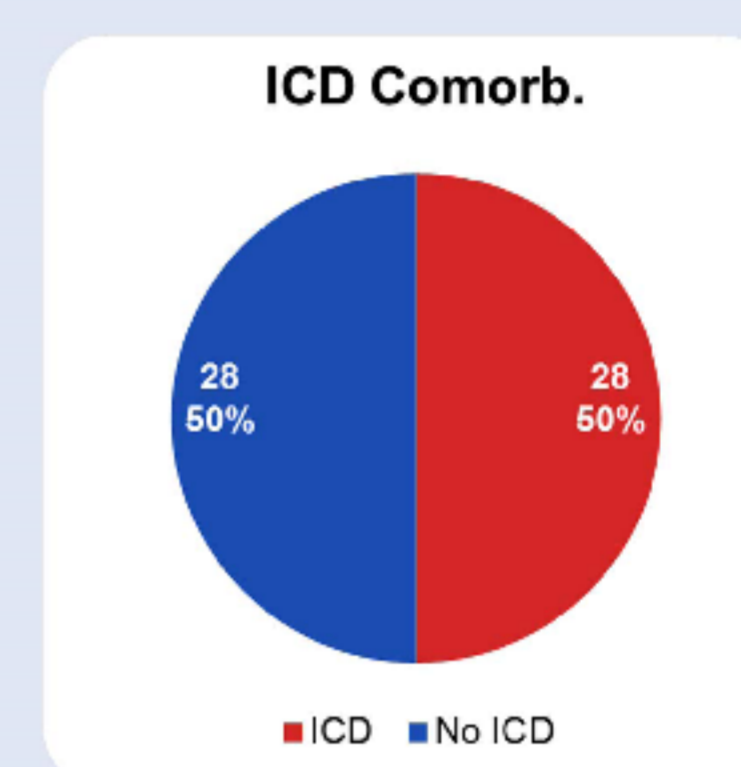
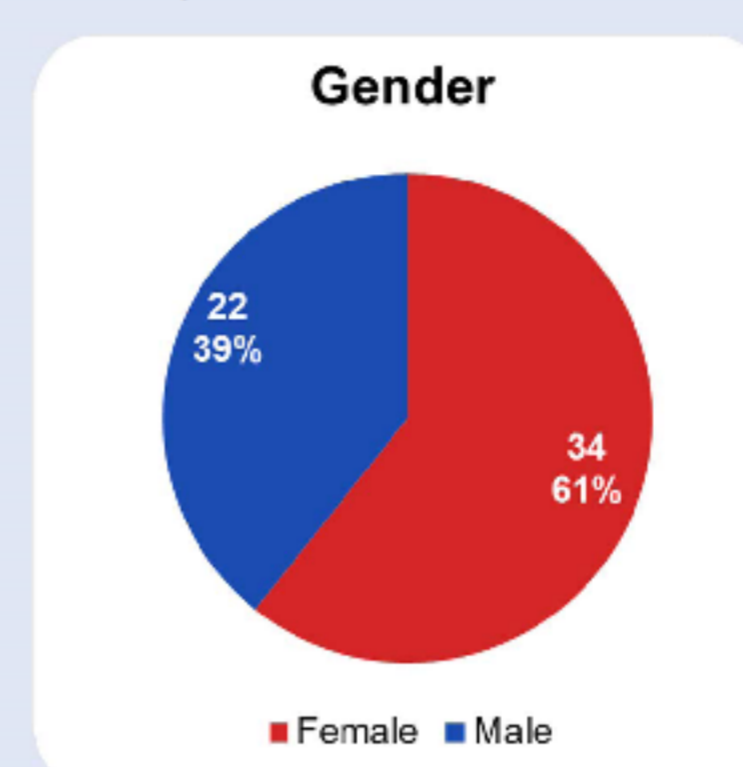
Our study has demonstrated that IntraLock® (4% citrate) is at least not inferior in performance, when compared to heparin and 30% citrate, as a catheter locking solution, without toxicity evidences.

## References

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- 4 – Vanholder R, et al. Diagnosis, prevention and treatment of haemodialysis CRBSI, a position statement of European Renal Best Practice (ERBP), *Nephrol Dial Transplant*; 3:234–246. – 2010
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## Results

The average age of the patients was 75 years ( $\sigma = 9.84$ ). Access vintage median was 37 months; 61% were female; 50% had at least one comorbidity (cardiovascular or haemorheological); 45% were diabetic; catheter insertion site was 95% in the jugular vein.



66% of the patients were moved from 30% citrate to 4% citrate, the remaining patients from heparin.

There were non-significant changes in the treatments outcomes, including Kt/V (OCM® - Online Clearance Monitor from Fresenius Medical Care). (table 1)

Indicators	30% Citrate or Heparin	4% Citrate (IntraLock®)	P
Qb (mL/min)	326	323	0.16
Kt/V	1.76	1.75	0.36
Substitution Volume (L)	19.6	19.9	0.09
HCT (%)	34.9	34.3	0.07
Hb (g/dL)	11.4	11.3	0.08

The average dose of ESA administered didn't change from the first period to the second and the Iron doses varied from 119mg/Kg/month to 139mg/Kg/month in the same periods. (table 2)

Indicators	30% Citrate or Heparin	4% Citrate (IntraLock®)	P
ESA(µg/Kg/month)	1.1	1.1	0.29
Iron doses (mg/Kg/month)	119	139	0.05

There were also non-significant changes in the infection and inflammation direct or indirect indicators, including Eosinophils, which we measured to understand the impact of the preservative<sup>5</sup>. (table 3)

Indicators	30% Citrate or Heparin	4% Citrate (IntraLock®)	P
CRP (mg/L)	1.07	1.05	0.27
Albumin (g/dL)	3.9	3.9	0.19
Leukocytes	6264	6283	0.47
Eosinophils (%)	3.3	3.2	0.23

There were non-significant changes in both periods regarding the use of antibiotics due to Catheter-Related Blood Stream Infections, fibrinolysis and catheter related hospitalization. Despite the non-significance, during the first period we found 0.30 infections per 1000 catheter-days vs. 0.15 infections per 1000 catheter-days in the IntraLock® period.

During both periods there were no reports of acute complications or allergic reactions.

