

# MIDLINES VERSUS SHORT PERIPHERAL INTRAVENOUS CATHETERS: WHICH DEVICE IS MORE SUSTAINABLE?

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## Background and Importance

Short peripheral intravenous catheters (PIVCs) and midlines (MIDs) are medical devices (MDs) used for peripheral intravenous drug administration. Their role in patient management is now well established, but little is known about their environmental impact.

## Aim and objectives



To calculate the carbon footprint of PIVC and MID insertion and use in our hospital, based on a patient cohort.

## Materials and methods



### Simplified Life-Cycle Assessment

Identification of MDs required for PIVC and MID insertion

Data collection from suppliers

Materials, mode of transport, and manufacturing, assembly, and sterilization sites

Weighing of each MD component by material type



Carbon footprint calculation using Carebone®

Estimation de l'empreinte carbone d'un dispositif médical

### Modeling Approach

Carbon footprint estimation according to catheter dwell time and treatment duration

Identification of the treatment duration threshold for MID sustainability over PIVC

### Real Life Application



Cohort of 315 patients

Patients received a MID in 2024

Estimation of overall carbon footprint impact

## Results



### Device requirement

#### PIVC

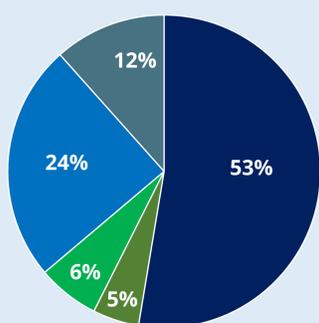
8 MDs required for insertion

#### MID

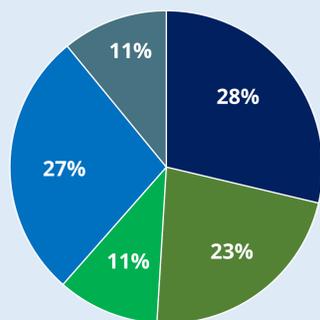
17 MDs required for insertion  
10 MDs for dressing change



### Carbon footprint



PIVC insertion  
2.1 kgCO<sub>2</sub>e



MID insertion  
7.3 kgCO<sub>2</sub>e

**Materials/excipients:** 1<sup>st</sup> emission source for MID and PIVC



**Packaging and instruction for use:** 3<sup>rd</sup> emission source for MID and final emission source for PIVC

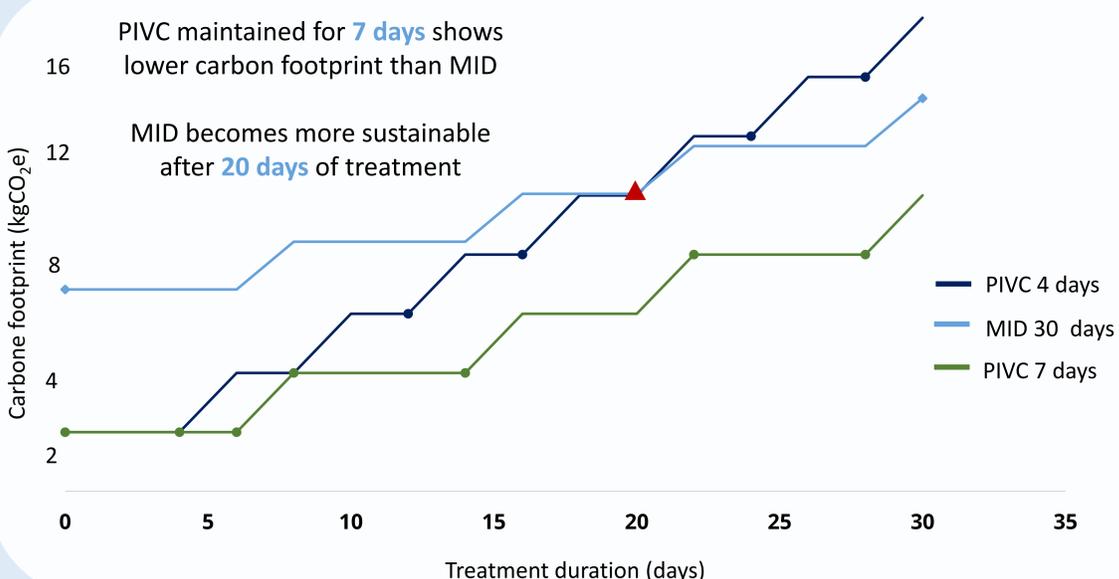
### Modeling Approach

3 dwell time scenarios

PIVC : 4 days

PIVC : 7 days

MID : 30 days



From an environmental perspective, MIDs are therefore advantageous for long-term treatments or when PIVC dwell time is short, particularly in patients with poor venous access



90,700 PIVCs and 709 MIDs inserted in 2024 at Ambroise Paré Hospital : equivalent to 224 Paris-New York flights

## Conclusion

The choice between MIDs and PIVCs cannot be based solely on environmental criteria, but sustainability can be added to the existing selection factors. A reasoned and thoughtful approach to the use of catheters—and medical devices in general—is essential to reduce the environmental impact of healthcare and to help preserve the environment.



### Patient cohort

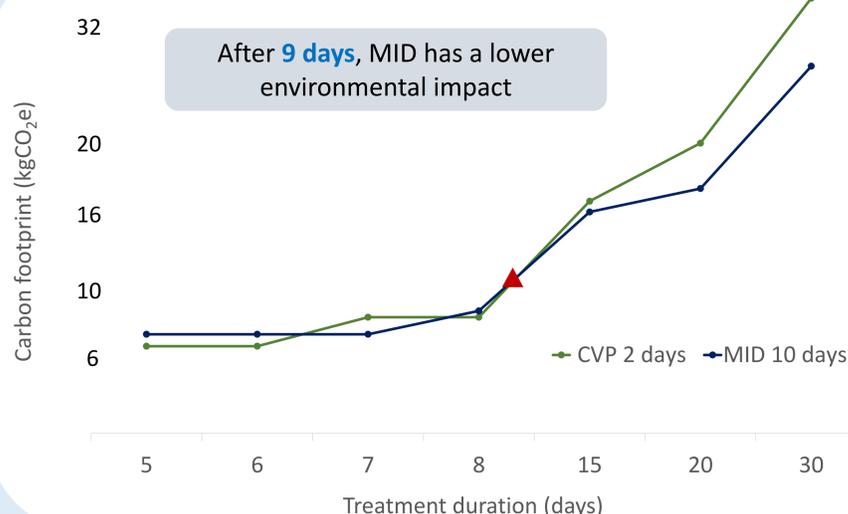
315 patients : 161 women and 154 men Mean age : 69 years old

92% of patients presented with poor venous access

Catheter mean dwell time: MID 10 days and PIVC 2 days

868 PIVC and 315 MID posed : 4,619 kgCO<sub>2</sub>e

Equivalent to 4 Paris New-York flights

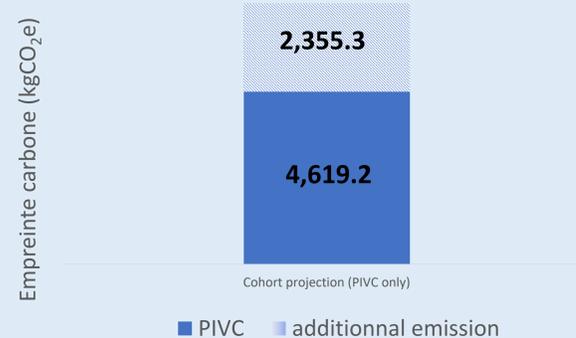


### Scenario without midline utilization

With exclusive CVP use: 3,251 PIVC would have been placed

6,974.5 kgCO<sub>2</sub>e

Equivalent to 8 Paris New-York flights



MID use reduced the overall cohort carbon footprint by 2,355 kgCO<sub>2</sub>e by avoiding repeated PIVC insertions

Equivalent to 2 Paris New-York flights



**Reducing packaging and paper leaflets:** use of multi-unit packaging and digital instructions for use  
**Optimising the use of medical devices:** collaborative work with healthcare teams to limit unnecessary consumption  
**Integrating environmental criteria** into medical device procurement  
**Raising awareness among healthcare teams** about the environmental impact of catheter use