# Enhancing Operational Efficiency: Time and Cost Savings of a Minimally Invasive Vascular Closure Device in Germany

**EE411**

Makowski V. [1], Kertous F. [2], Teßarek J. [3], Topouchian A. [2]
[1] Terumo Germany GmbH, Eschborn, Germany, [2] Terumo Europe, Leuven, Belgium, [3] Bonifatius Hospital, Lingen, Germany

## Background

I. Vascular Closure Devices (VCD) are designed to achieve rapid hemostasis at the access site of percutaneous endovascular procedures (PEP).
II. Compared to the standard of care, manual compression (MC), VCD may bring meaningful time savings, earlier patient ambulation and discharge.

## Objective

**This analysis evaluated the efficiency gains of VCD compared to manual compression (MC) by measuring the time to hemostasis (TTH) and the associated procedure cost in a single reference hospital in Germany.**

## Methods

I. Data Extraction:
Data were extracted from a prospective, multi-center observational study (ANGIOSEAL-CLOSE, NCT05335525), focusing on a subset of 73 patients treated at Bonifatius Hospital in Lingen. One secondary effectiveness endpoint of the study was the mean time to hemostasis (TTH).

II. Cost Data:
Cost impact was estimated by calculating the total time savings in minutes and multiplying them by the average procedural cost per minute for the hybrid operating room (OR) (with angiography unit) used at Bonifatius Hospital Lingen. The average cost was extracted from the German nationwide DRG cost matrix of the associated DRG F59C.

## Results

| Overall time to hemostasis (TTH) N=73 | Minutes | Seconds |
|---|---|---|
| Mean | 0.4 | 24 |
| Standard Deviation | 1.55 | 93 |

Time to Hemostasis (TTH) = time of cessation of arterial bleeding – time of sheath removal

**Hybrid OR Cost Calculation (from German average DRG Cost Matrix F59C):**

| | |
|---|---|
| 4-1: Procedural Cost Operating Room – Medical Service: | 451.31 € |
| 4-3: Procedural Cost Operating Room – Medical Technical Service: | 367.10 € |
| 4-7: Procedural Cost Operating Room – Medical Infrastructure: | 195.05 € |
| 4-8: Procedural Cost Operating Room – Non-Medical Infrastructure: | 271.91 € |
| 9-1: Procedural Cost Radiology - Medical Service: | 176.06 € |
| 9-3: Procedural Cost Radiology - Medical Technical Service: | 152.05 € |
| 9-7: Procedural Cost Radiology - Medical Infrastructure: | 60.71 € |
| 9-8: Procedural Cost Radiology – Non-Medical Infrastructure: | 101.02 € |
| Total: | 1,775.21 € |

Assuming an average procedure time of 30 minutes for a standard percutaneous endovascular procedure (PEP)[1], the average procedural cost per minute of procedure time in the hybrid operating room can be calculated as

1,775.21 € / 30 min = 59.17 €/min

Manual compression (MC) results in an average time to hemostasis (TTH) of 15 minutes [3].

The average time to hemostasis (TTH) in this patient cohort of 73 patients treated with VCD was 0.4 minutes, resulting in a time saving of 14.6 minutes per procedure and leading to procedural cost savings of 14.6 min x 59.17 €/min = 863.94 € per procedure or €63,067 for the total patient cohort.

## Conclusion

The mean TTH with VCD use was <1 minute (0.4 minutes i.e. 24 seconds) compared to 15 minutes with MC, resulting in an average time saving of 14.6 minutes per patient. Across the 73 patients, this resulted in a total time saving of 1,066 minutes (approximately 18 hours). Based on an estimated cost of €59.17 per minute for a hybrid OR with angiography unit, the total cost savings amounted to €63,067 for the patient cohort.

**The use of VCD led to a dramatic reduction in TTH by 97% and resulted in a 49% reduction (863.94 € per patient) in associated procedural cost for the hybrid OR. These findings support the adoption of minimally invasive VCDs to reduce the risk of complications for the patients, to enhance procedural efficiency and alleviate healthcare professionals' workload, and enable a more resilient healthcare system.**

**References:** [1] Estimation from expert interviews
[2] InEK DRG-Reportbrowser 2023 grouped for 2025
[3] Comparison of Angioseal and Manual Compression in Patients Undergoing Transfemoral Coronary and Peripheral Vascular Interventional Procedures, Alshehri A., Elsharawy E., Int J Angiol. 2015 Mar 23;24(2):133–136. doi: 10.1055/s-0035-1547449

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