

PUBLIC  
**ANNUAL REPORT**  
**2023**

**OUT-OF-HOSPITAL CARDIAC ARREST 2023**

by Deutsches Reanimationsregister – German Resuscitation Registry (GRR)

Deutsches  
Reanimationsregister



**Note:**

The German Resuscitation Registry (GRR) is an online database with a constantly growing number of data sets. Due to different analysis dates, the figures given may differ from those in previously published reports.

The eighth public annual report on out-of-hospital cardiac arrest (OHCA) by the German Resuscitation Registry (GRR) contains the current data, facts and figures on resuscitation provided by the participants in the German Resuscitation Registry in 2023.

This public annual report on out-of-hospital cardiac arrest is addressed to all participants and the public in order to further develop resuscitation care in Germany, fully in line with the Bad Boll Resuscitation Dialogues and the overall social responsibility [1–3].

Data records from 146 emergency medical services (EMS), representing a population of approx. 39 million inhabitants, are used as a foundation. Thus, reliable

information on the resuscitation incidence in Germany, but also on the care of these patients and the success of treatment can be obtained.

As a limitation, it is to be noted that due to the voluntary participation in the German Resuscitation Registry (GRR) the data analysed represent a sample and may not be fully representative. This brief report is only a partial summary of the recorded data. The presentation is based on the Utstein Report [4], the international standardized reporting format for out-of-hospital cardiac arrest. If simplified of „CPR“ is spoken, it is out-of-hospital (EMS) resuscitation procedures for OHCA of various suspected or confirmed causes.

In the following, the overall data from the German Resuscitation Registry (GRR) for the period 01.01.2023 up to and including 31.12.2023 were analyzed. In addition, the data of a reference group of 46 German emergency medical services from the same period were analyzed, which met the following inclusion criteria:

- Incidence of resuscitation >30/100,000 inhabitants and year
- ROSC (Return Of Spontaneous Circulation) <80%
- RACA (ROSC after Cardiac Arrest) score calculable >60%
- Percentage of documented follow-ups of at least 30%

By determining the reference data, the results become more accurate, and statements regarding the discharge rate and the neurological outcomes at discharge are also possible.

1. Fischer M, Wnent J, Gross B, Seewald S, Maurer H, Ramshorn-Zimmer AB et al: Qualitätsmanagement in der gesamten Reanimationsversorgung ist unerlässlich. These 9 der Bad Boller Reanimations- und Notfallgespräche 2023. *Anästh Intensivmed* 2023;64:523–527
2. Gräsner JT, Wnent J, Zwißler B, Beck G, Fischer M: 10. Bad Boller Reanimations- und Notfallgespräche – Zeit für ein Update. *Anästh Intensivmed* 2023;64:473–475
3. Wnent J, Geldner G, Werner C, Bottiger BW, Fischer M, Scholz J, et al: Bad Boller resuscitation talks: 10 basic ideas for 10,000 lives. *Anästhesiol Intensivmed Notfallmed Schmerzther* 2014;49(3):208
4. Perkins GD, Jacobs IG, Nadkarni VM, Berg RA, Bhanji F, Biarent D, et al. Cardiac arrest and cardiopulmonary resuscitation outcome reports: update of the Utstein Resuscitation Registry Templates for Out-of-Hospital Cardiac Arrest: a statement for healthcare professionals from a task force of the International Liaison Committee on Resuscitation (American Heart Association, European Resuscitation Council, Australian and New Zealand Council on Resuscitation, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, Resuscitation Council of Southern Africa, Resuscitation Council of Asia); and the American Heart Association Emergency Cardiovascular Care Committee and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation. *Circulation* 2015;132:1286–1300. Epub 11. November 2014.



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## NUMBER OF PATIENTS AND EMERGENCY MEDICAL SERVICES

25,558

from 146 emergency medical services

In 2023, the total number of out-of-hospital cardiac arrests documented in the German Resuscitation Registry was 25,558 from 146 emergency medical services.

The chosen reference group for this report meets the above mentioned inclusion criteria and comprises 10,378 patients from 46 EMS.

10,378

from 46 emergency medical services

The reference group is highlighted in the report. This group is supplemented by the overall data. The overall data is indicated as such in this report.



## INCIDENCE OF OUT-OF-HOSPITAL CARDIAC ARREST

In 2023, the incidence of CPR was 64.9 CPRs per 100,000 inhabitants per year in the overall data. Extrapolated to Germany's current population of 84.6 million, in 2023 approximately 55,000 patients were resuscitated by the emergency medical services after a sudden cardiac arrest.

At the reference sites, the incidence of death declarations, resuscitations, and performed resuscitation treatments was significantly higher than in the overall group. Therefore, underreporting in the overall data cannot be ruled out.

### Death declaration and resuscitation

**166.5** | 126.5  
per 100,000 inhabitants per year | overall data

### CPR by EMS

**84.7** | 64.9  
per 100,000 inhabitants per year | overall data

## AGE OF PATIENTS

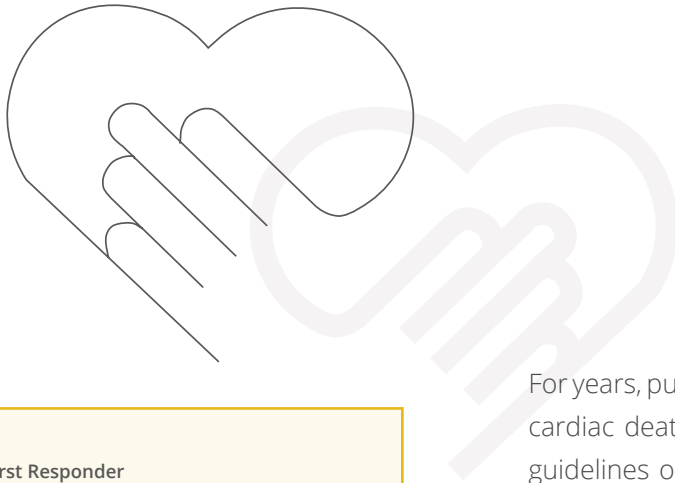
The average patient is an approx. 70 year old male. Very young patients - younger than 18 years - were rarely resuscitated. An increasing number of patients aged over 80 years can be observed over time; their proportion is now more than 32.7% (2014: 27.7%).



## GENDER DISTRIBUTION







## CPR BEFORE EMS ARRIVAL

### First Responder

In Germany, first responders are voluntary units that are not part of the regular EMS but are used by the dispatch centres to bridge the interval until the EMS arrives. This includes people who work in BOS (authorities and organisations with security tasks) (e.g. fire brigade). In the current data set, the term first responder also includes activated bystanders (smartphone-based bystander alerting). Starting in 2025, the data of first responders and activated bystanders will be recorded separately in accordance with the current Utstein report.

### Bystander

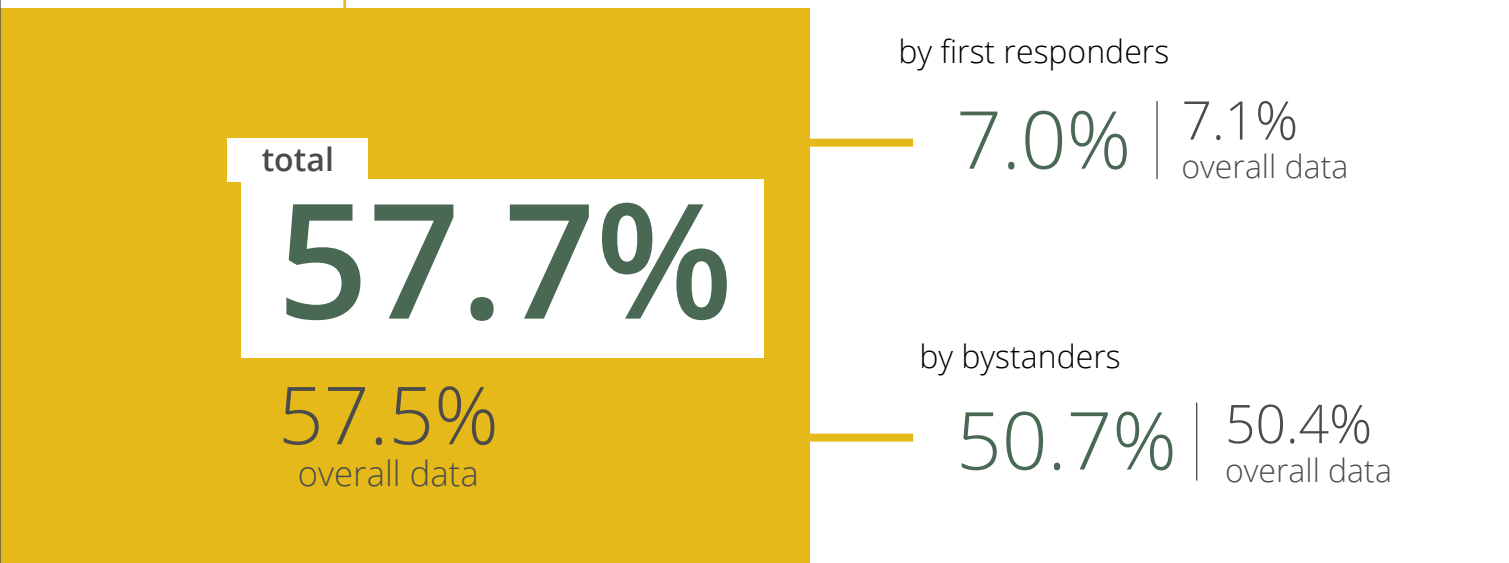
Non-alert persons who happen to be at the scene of an emergency by chance and bridge the time between the incident and the arrival of the emergency medical services, thus shortening the non-ambulance interval.

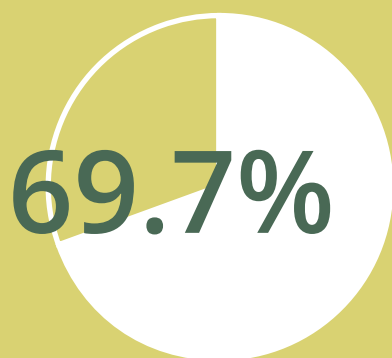
For years, public campaigns have aimed to draw attention to sudden cardiac death and possible CPR by bystanders. Furthermore, the guidelines on CPR recommend telephone guided CPR by dispatch centers.

The 2023 annual report shows a bystander CPR rate of 50.7% in the reference group and telephone guided CPR was 33.0% in the reference group. There was no change compared to previous years.

**NOTE:** The German Resuscitation Registry has adjusted the basis for calculating the first responder resuscitation/telephone resuscitation rate since the 2022 annual report and now calculates the first responder resuscitation/telephone resuscitation rate on the basis of all resuscitations that were not observed by the emergency medical services. This reduces the population and increases the respective rate.

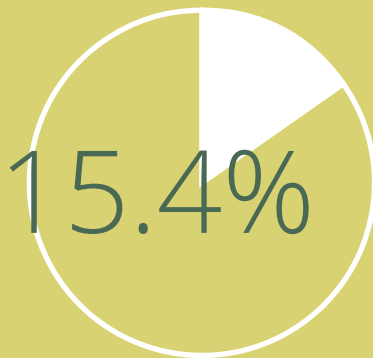
In 7.0% of the cases, first responders carried out CPR before the EMS arrived.





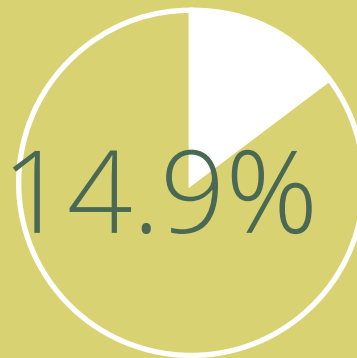
at home

69.9%  
overall data



in public

15.3%  
overall data



other sites

14.8%  
overall data



## WITNESSED CARDIAC ARRESTS

overall observed cardiac arrest



57.1%  
overall data

by bystanders

**42.0%**

42.4%  
overall data

by first responders

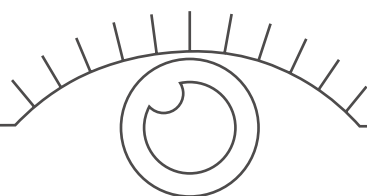
**1.3%**

1.7%  
overall data

by EMS

**13.5%**

13.0%  
overall data



## TELEPHONE GUIDED CPR

The vast majority of resuscitations in 2023 also took place in private homes.

# 33.0%

33.9%  
overall data



In recent years, we have seen a steady increase in the number of cases supported by telephone guided CPR. However, there is still considerable potential for growth [5].

## TIME BETWEEN ALARM AND ARRIVAL OF THE 1ST VEHICLE

The average time between receiving the alarm and arriving at the scene with the first EMS unit (RTW or NEF) was **6 minutes and 48 seconds**.

# 06:48 ± 03:45

07:34 ± 04:25  
overall data

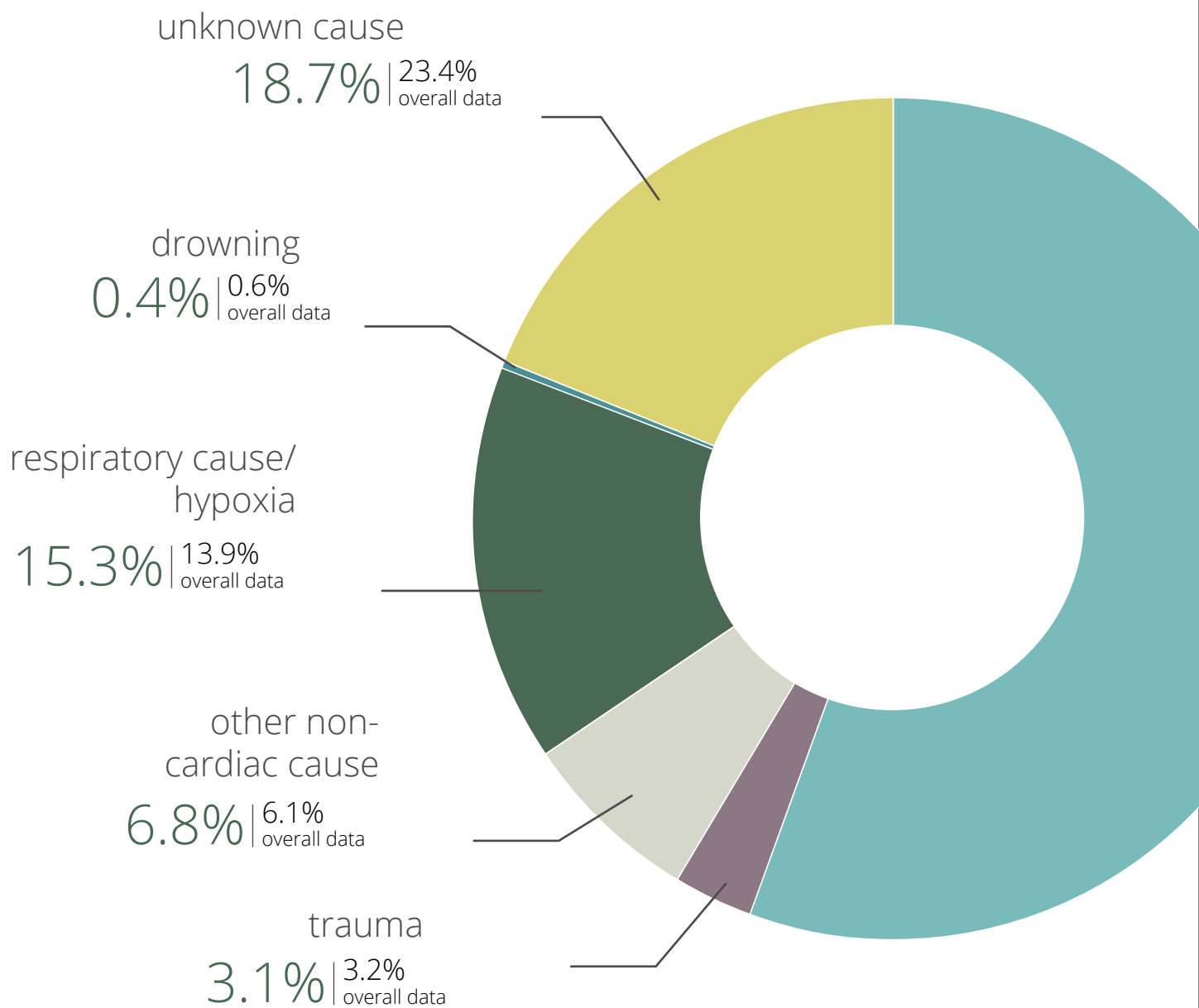


**RTW** = Rettungswagen, ALS-ambulance  
**NEF** = Notarzteinsatzfahrzeug, Emergency physician's car

5. Gross B, Gistrichovsky M, Baubin M, Wnent J, Bohn A: Die Leitstelle als wichtiges Glied der Überlebenskette. These 7 der Bad Boller Reanimations- und Notfallgespräche 2023. Anästh Intensivmed 2023;64:515-518.

## SUSPECTED CAUSE OF CARDIAC ARREST

Information on causes of cardiac arrest is based on the suspected diagnoses of the emergency physicians. Of course, this information may differ from the exact diagnoses.



## FIRST RECORDED ECG RHYTHM

shockable (VF/VT)

**21.0%**

21.8%  
overall data

VF = ventricular fibrillation  
VT = ventricular tachycardia

non-shockable

**78.9%**

78.2%  
overall data

asystole

56.8% | **55.3%**  
overall data

pulseless electrical activity

21.4% | **23.6%**  
overall data

cardiac cause

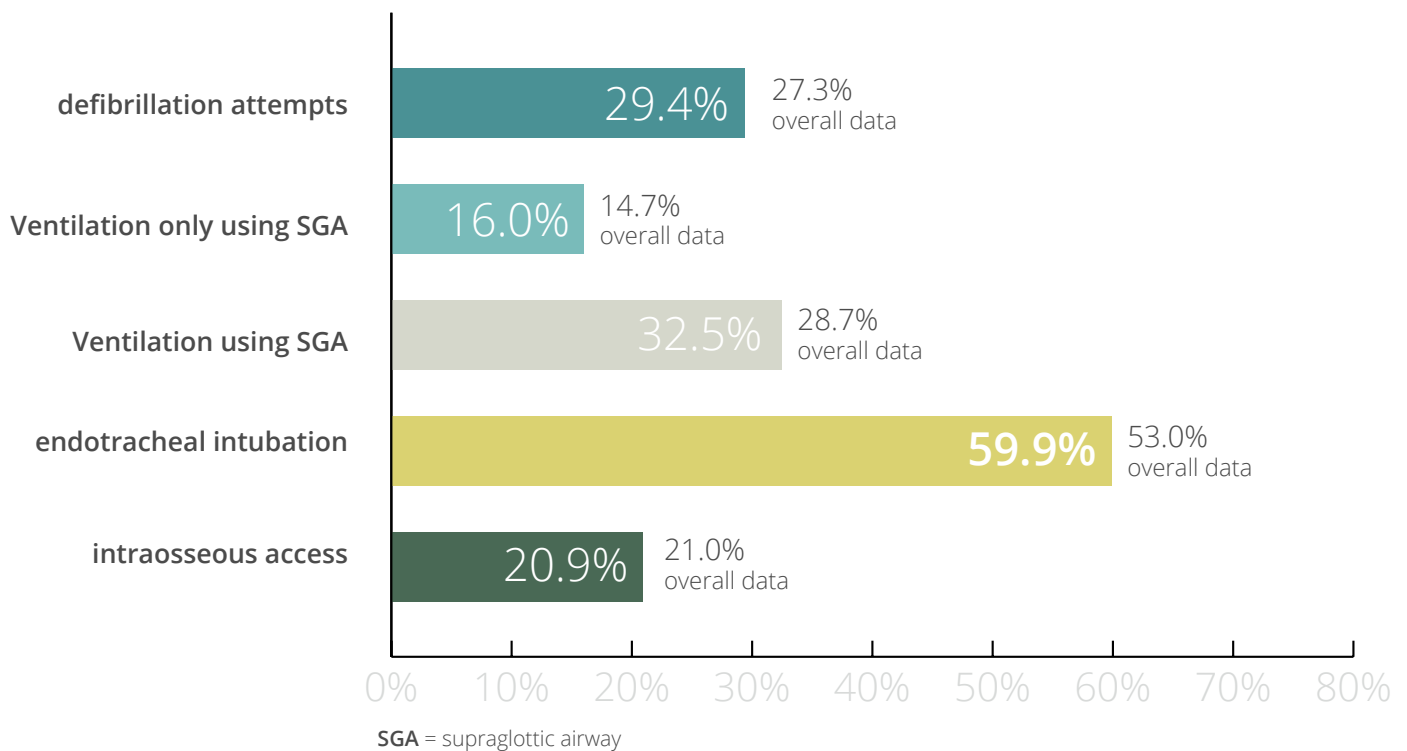
**55.7%** | 52.8%  
overall data



## RESUSCITATION PROCEDURES

Compared to 2022, significant changes can be seen in the area of airway management. Endotracheal intubation using a video laryngoscope increased, while the use of a supraglottic airway device (SGA) decreased. This is a positive development, as it has been shown in Germany and Austria [6] that the use of endotracheal intubation increases the discharge rate by 35% compared to the supraglottic airway alone.

The other resuscitation measures remained unchanged from the previous year. In particular, the use of intraosseous access remains too high at 20.9%, although the new ERC guidelines published in 2021 clearly indicate that intravenous access should be favoured in resuscitation [7].



## USE OF MECHANICAL CHEST COMPRESSION DEVICES

**13.0%** | 10.4% overall data

## OUTCOME OF EMS TREATMENT

In 2023 30.5% (overall data) to 32.5% (reference group) of patients reached the hospital with spontaneous circulation.

Standardised to 100,000 inhabitants per year, around nine patients per 100,000 inhabitants were discharged from hospital alive.

	ROSC	<b>41.4%</b>	overall data
			39.9%
ROSC on admission to hospital		<b>32.5%</b>	30.5%
	24-hour survival	<b>19.9%</b>	
discharged alive from hospital		<b>10.4%</b>	

6. Sulzgruber P, et al: The impact of airway strategy on the patient outcome after out-of-hospital cardiac arrest: A propensity score matched analysis.

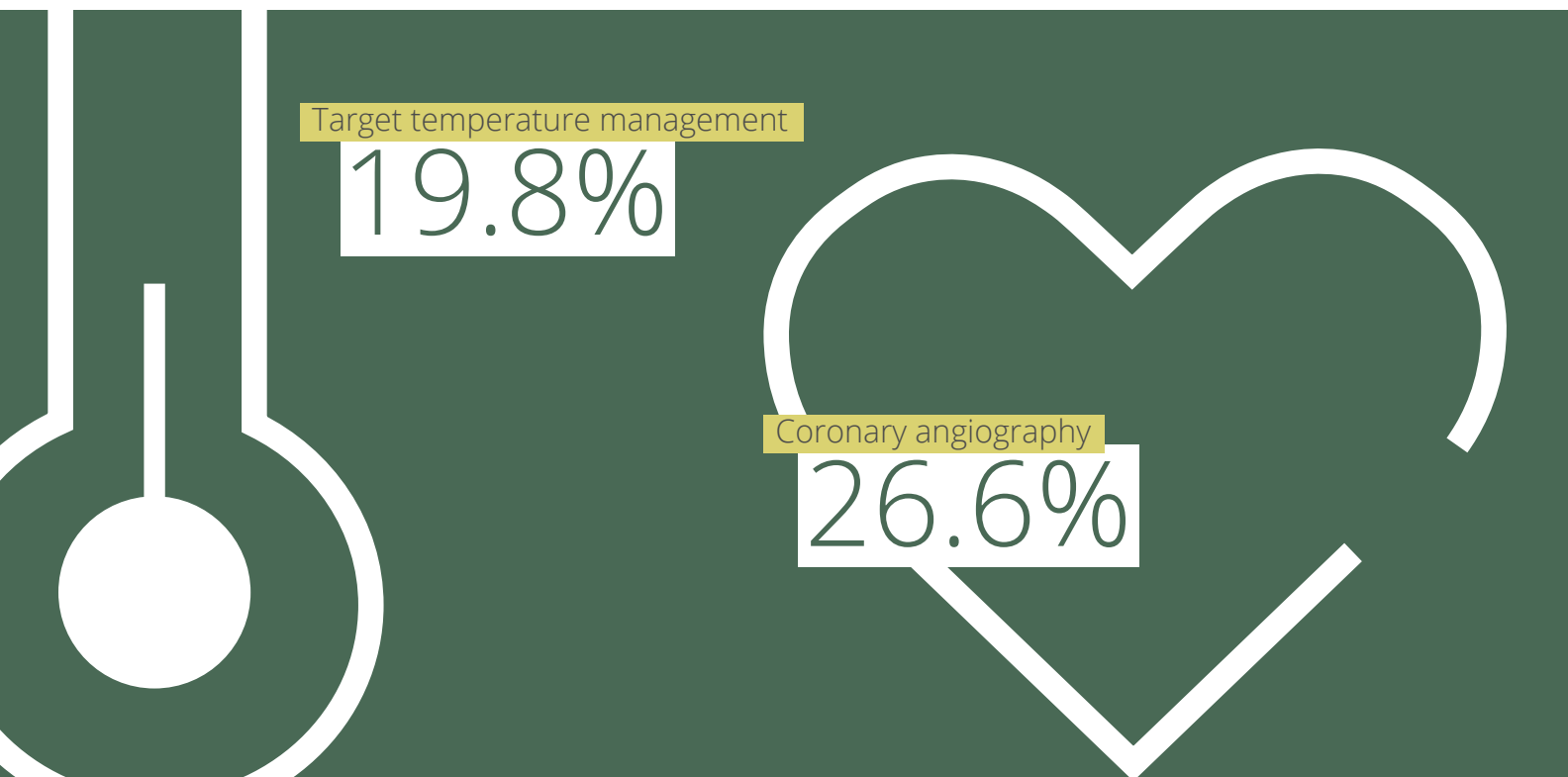
Eur Heart J Acute Cardiovasc Care, 2017;2048872617731894

7. Soar J, et al: European Resuscitation Council Guidelines 2021: Adult advanced life support. Resuscitation 2021;161:115-151

## IN-HOSPITAL TREATMENT

Hospital treatment has a relevant impact on survival after successful resuscitation. Current guidelines recommend coronary angiography and intervention in particular, as well as temperature management [8]. The frequency of coronary angiography and the level of care in the area of temperature management decreased slightly in 2023 compared to the previous year. Since 2021, the ERC guidelines have recommended temperature management for every initial rhythm and regardless of whether the cardiac arrest occurred inside or outside the hospital. It remains to be seen whether the rate of interventions will increase and whether the guidelines published in 2021 will be implemented accordingly.

8. Nolan JP, et al: European Resuscitation Council and European Society of Intensive Care Medicine guidelines 2021: post-resuscitation care. Intensive Care Med 2021;47(4):369–421



## SUMMARY

The present annual report „Out-of-hospital cardiac arrest 2023“ by the German Resuscitation Registry (GRR) confirms the overall good quality of CPR care in the participating emergency medical services.

In 2023, the data from the resuscitation registry also documented deviations from guidelines and recommendations. For instance, in terms of response times, the target of 80% for reaching patients within 8 minutes of the emergency call was missed. According to current guidelines, there is still potential for improvement in areas such as telephone CPR, airway management, vascular access, the use of mechanical resuscitation devices, and temperature management.

We want to thank all participating emergency medical services. As of the cut-off date in 2023, data from 26,234 patients were recorded in the registry (of which 25,558 were from Germany and 676 were from Austria).

The German Resuscitation Registry was developed as a quality assurance tool for emergency medical services. In addition to monthly and annual reports, the participants

also receive access to online analyses in order to continuously benchmark, assess and improve the performance of their service - as required by the current resuscitation guidelines [9]. For example, the ROSC-after-Cardiac-Arrest (RACA) score [10] developed from the register data is available in the online database for this purpose. The annual report of the German Resuscitation Registry on out-of-hospital cardiac arrest in 2023 provides information on the status and trends in resuscitation care in Germany and forms the basis for discussions.

Since cardiac arrest and resuscitation treatment are among the most time-critical and complex clinical conditions in emergency medicine, this result should be an incentive to further improve quality management and the overall quality of care in one's own emergency medical services.

The data on which this report is based and further information can be found in *Anästhesiologie und Intensivmedizin* (Anästh Intensivmed 2024;65:V101-V110).

9. Perkins GD, et al: European Resuscitation Council Guidelines 2021: Executive summary. *Resuscitation* 2021;161:1-60.

10. Gräsner JT, et al: ROSC after cardiac arrest - the RACA score to predict outcome after out-of-hospital cardiac arrest. *Eur Heart J* 2011;32(13):1649-1656

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**... and the participating Emergency Medical Services in the German Resuscitation Registry (GRR)**

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