Handover of the out-of-hospital cardiac arrest patient from prehospital to in-hospital care

Nederlandse Reanimatie Raad

A guideline from the
Dutch Resuscitation Council

www.reanimatieraad.nl

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This guideline was created by
a national working group of the Regional
Ambulance Services and
hospitals from the following regions:

Amsterdam
Brabant
Flevoland
Gooi & Vechtstreek
Haaglanden
Overijssel
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1. Introduction

Resuscitation involves a chain of care: the better the links in the chain fit together, the greater the chance that the care will be effective. This process is illustrated by the 'chain of survival'. People who suffer an out-of-hospital cardiac arrest have a greater chance of survival if effective links exist between prehospital care and in-hospital care.

In recent years, much has improved in the field of cardiopulmonary resuscitation (CPR), especially in the phase between the emergency call and the arrival of the emergency medical services (EMS). Advances have been made in the process of the dispatch centre, the citizen responder system and the use of the Automatic External Defibrillator (AED). However, there is still room for development at the national level when it comes to standardising the transition from EMS to hospital care.

About 7 out of 10 out-of-hospital cardiac arrest (OHCA) patients are transported to hospital. A study by the AmsteRdam REsuscitation STudy (ARREST) group found that return of spontaneous circulation (ROSC) is achieved in 58% of all out-of-hospital cardiac arrest patients. Of the patients in whom ROSC is not achieved, 27% are transported to hospital while undergoing resuscitation (De Graaf, Resuscitation 2019). For both categories of patients, effective and efficient handover and immediate management is essential. In particular, the handover of a patient during CPR is a major challenge as CPR has to be continued during the handover.

The handover is a critical moment. During handover, the focus on the resuscitation process may possibly be reduced, resulting in reduction in the quality of CPR. Loss of information may also occur, increasing the risk of errors, and suboptimal communication may result in the appropriate treatment being delayed or not being instigated. Up to now, the Netherlands lacked a standard procedure for the handover of OHCA patients. Differences between approaches at both regional and local level can lead to miscommunication and errors.

Standardising the handover of out-of-hospital cardiac arrest patients from prehospital to in-hospital care makes this process uniform and clear. The continuing advances in hospital diagnostics (e.g. ultrasound) and treatment (e.g. percutaneous coronary intervention and extracorporeal membrane oxygenation) make optimising patient transport and handover even more important. In addition, a clear and accurate pre-alert and communication gives the resuscitation team receiving the patent a good overview of the situation, enabling them to prepare more effectively and avoid loss of treatment time.

The Dutch Resuscitation Council hopes that the practical implementation of this guideline will further improve the care that out-of-hospital cardiac arrest patients receive and increase the chance of a good outcome. We therefore welcome suggestions for further improvements.

2. Goals and principles

The goal of this guideline is to ensure a smooth transition from the pre-hospital to the in-hospital setting for patients undergoing CPR or who have received CPR outside of the hospital, with the aim of increasing the likelihood of survival, while optimising patient safety and efficiency.

This guideline is based on the following principles:

1. During the handover, high quality CPR must be ensured at all times.
2. Relevant information from the prehospital setting must be communicated to the right place at the right time and the information should be recorded.
3. In case of patients who are transported while undergoing CPR, the reason for transport should be clear to the receiving hospital before arrival so that specific preparations can be made. The diagnosis and recommendations resulting from the SBAR method (situation, background, assessment, recommendation) must be taken seriously by the hospital team.
4. Preparation by the receiving hospital must be optimal, in terms of materials, personnel, logistics and task allocation.
5. During the verbal handover by the paramedic [1] at the receiving hospital, rhythm checks every two minutes are less important than the quality of the hand-over. Regular rhythm checks are still necessary, but a good handover is more important for treatment than the exact time management of the two-minute blocks during handover.
6. This guideline applies to out-of-hospital cardiac arrest patients in the broadest sense, including patients with ROSC after CPR. It also applies to both adults and children.
7. The guideline applies to all ambulance regions and hospitals in the Netherlands and should therefore be implemented at national level.

1 Throughout this document, the term 'paramedic' is used as a generic term for prehospital care providers and can refer to an emergency medical technician (EMT), paramedic, ambulance nurse, nurse practitioner, physician assistant or other prehospital medical care provider.

3. The guideline

Based on the goal and the principles, a standard step-by-step procedure has been developed to optimise the handover of out-of-hospital cardiac arrest patients. It starts with the paramedic contacting the receiving hospital by phone to give a pre-alert and continues until the resuscitation team has taken over care of the patient after having received all the information required to do this effectively.

Following the pre-alert from the ambulance crew, the receiving hospital alerts the resuscitation team that will receive the patient. The receiving team holds a briefing and checks all of the materials needed to receive the patient. On the patient's arrival, the paramedic gives a verbal handover to the resuscitation team, following the procedure described in this document.

This guideline consists of a number of practical components: an ambulance protocol for pre-alert by the paramedic, a form for the hospital to receive and document this information, a briefing and checklist for the resuscitation team, and a whiteboard format for handover notes.

Last but not least, the guideline gives practical advice for the physical handover of the patient from the ambulance crew to the resuscitation team. A graphic overview of the handover including the place of the tools which have been developed to streamline the handover can be found on the next page.

Below is a graphic overview of the handover, including the tools which have been developed to streamline the handover and the recording of the information.

3.1 Ambulance crew pre-alert to hospital

The paramedic contacts the receiving hospital by phone to give a pre-alert as soon as possible after the decision to transport the patient. To give the resuscitation team at the receiving hospital the opportunity to prepare, this should preferably be done at least 20 minutes before arrival. The majority of the required information in the checklist below should be known to the paramedics.
If information is missing, this should be stated explicitly, for example: 'previous history unknown'.

Ambulance protocol

Resuscitation pre-alert to hospital

S

Situation
- identify yourself (region, ambulance number)
- transport with ROSC or performing CPR (manual or mechanical)
- Estimated time of arrival (ETA)
- patient: male/female + name, date of birth or (approximate) age
- onset time of cardiac arrest
- witnessed or unwitnessed arrest
- BLS started before ambulance arrival
- first rhythm, or AED shock

B

Background
- relevant history
- medication

A

Assessment
- type of airway
- $EtCO_2$
- in the case of ROSC: AVPU, respiratory sufficiency, SpO_2, heart rate and blood pressure
- working diagnosis

R

Recommendation
- location
- personnel
- treatment

Form

Resuscitation pre-alert by ambulance crew to hospital

S

Ambulance: ……

Transport with ROSC / performing CPR, manual / mechanical compressions

Arrival time: …… : ……

(<10 minutes? alert resuscitation team immediately)

Patient: Mr / Ms ……

Date of birth or (estimated) age: ……

Onset time of cardiac arrest: ……

Arrest: witnessed / unwitnessed; **BLS before ambulance arrived:** no / yes; **AED shocks:** no / yes, number of shocks ……..

First rhythm observed by ambulance: Sinus rhythm / VF / VT / PEA / asystole
Other: ……..
With / without **output**

B

Previous history: ……

……

Medication: ……..

A

Airway: open / mask / SGA / endotracheal tube / cricothyrotomy

$EtCO_2$: …….. mmHg / kPa

In the case of ROSC: **Consciousness:** Alert / Verbal / Pain / Unresponsive

Breathing: adequate / inadequate, SpO_2: …….. %

Heart rate: …….. / min

Blood pressure: …….. / ……. mmHg

Working diagnosis/reversible cause: ……

R

Recommendations by ambulance: ……

……

Repeat pre-alert and specify receiving location

3.2 Preparation by resuscitation team

Briefing and checklist

Preparation reception by resuscitation team

Briefing of resuscitation team

1 Introductions
- First name and function
- These should be visible, e.g. on name stickers

2 What we know
- Pre-alert information by ambulance
- Is patient known in the hospital?

3 What we are going to do (plan A)
- Summarise handover process
- Specific priorities for diagnostics, treatment and logistics
- In the case of children: calculate correct medication dosage etc.
- Are additional materials or other specialties needed?
- Consider pre-alert for catheterisation laboratory, OR, ICU or CT

4 What might change (plan B/C)
- What could change the initial plan?
- What would be the plan in that case?

5 Allocation of roles and tasks
- Select team leader

Checklist

- ☐ **Optimum set-up of the room**
- ☐ **Defibrillator and monitor on**
- ☐ **Mechanical chest compression device ready for use**
- ☐ **Capnography working, connected to self-inflating bag**
- ☐ **Suction working, Yankauer within reach**
- ☐ **Airway equipment ready (bag-valve-mask, SGA and intubation materials)**
- ☐ **Check ventilator**
- ☐ **Prepare medication, adrenaline drawn up**
- ☐ **Ultrasound present in room, plugged in and switched on**
- ☐ **Intraosseous device available**
- ☐ **Documentation ready**
- ☐ **Arterial line available? (Consider preparing for use)**
- ☐ **Materials for blood sampling**

Whiteboard

Out-of-hospital cardiac arrest handover from ambulance crew to resuscitation team

S

Patient: Mr / Ms .....

Date of birth or (estimated) age: .....

Onset time of cardiac arrest: .....

Arrest: witnessed / unwitnessed; BLS before ambulance arrived: no / yes; **AED shocks:** no / yes, number of shocks .....

First rhythm in ambulance: Sinus rhythm / VF / VT / PEA / asystole
Other: ..... With / without **output**

Duration of CPR: ..... min.

Number of defibrillation attempts: ..... times

Medication given: ..... mg adrenaline
..... mg amiodarone
..... mg .....
..... mg .....

Transportation with: ROSC / ongoing CPR, manual / mechanical compressions

B

Previous history: .....

.....

Medication: .....

A

Airway: open / mask / SGA / endotracheal tube / cricothyrotomy

$EtCO_2$: ..... mmHg / kPa

In the case of ROSC: **Consciousness:** Alert / Verbal / Pain / Unresponsive

Breathing: adequate / inadequate, SpO_2: ..... %

Heart rate: ..... / min

Blood pressure: ..... / ..... mmHg

Working diagnosis/reversible cause: .....

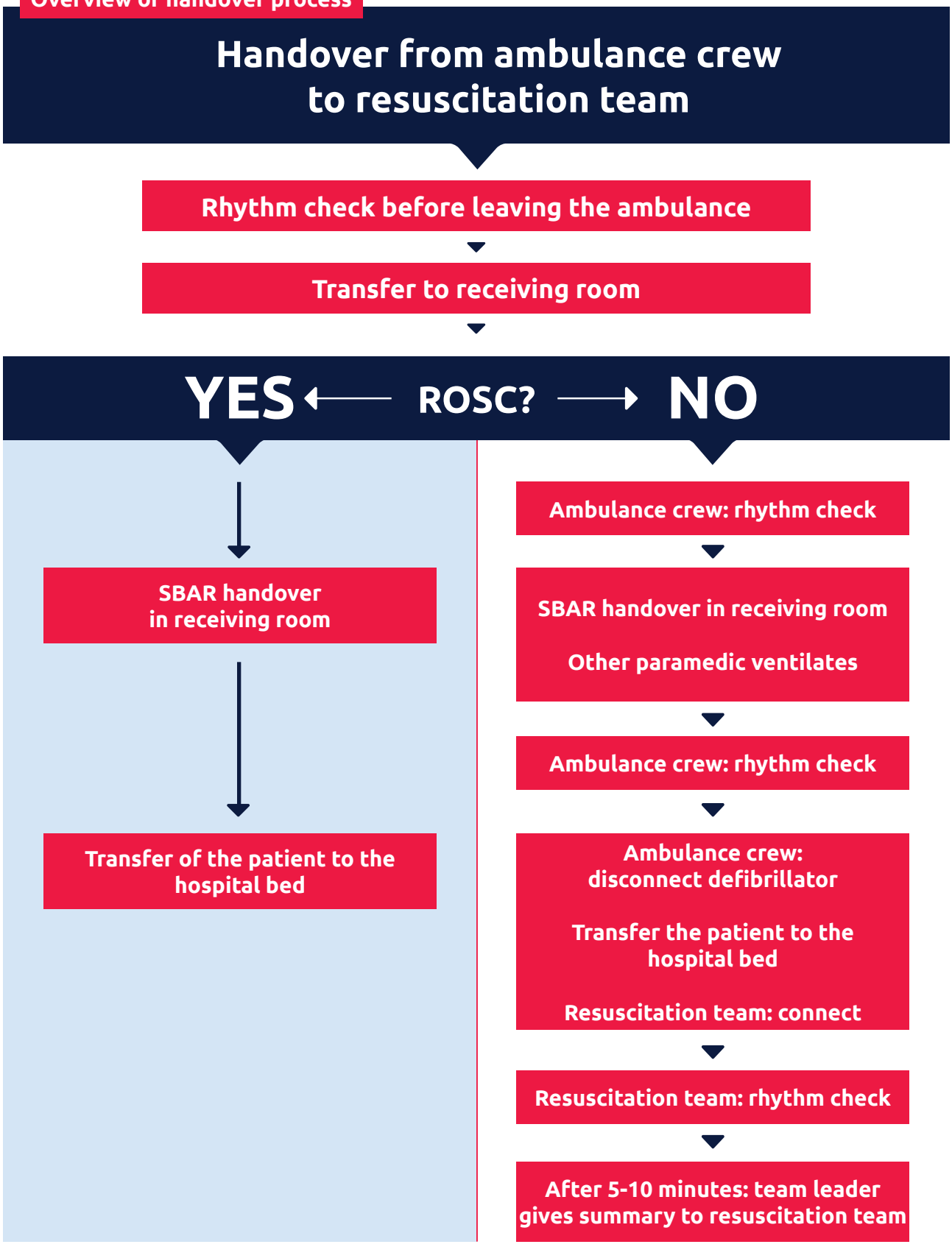
R

Recommendations by ambulance: .....

.....

3.3 Handover from ambulance crew to resuscitation team

Overview of handover process



Handover protocol

Handover from ambulance crew to resuscitation team

1. Rhythm check by ambulance crew before leaving ambulance and on arrival in receiving room. In the case of ROSC: confirm output. Any medication is given by paramedic.
2. In the case of manual chest compressions: hospital staff take over compressions, on step stool if necessary.
   Ventilation is continued by another member of ambulance crew, leaving first paramedic free for handover. Family members are taken care of by dedicated staff.
3. Team leader makes his/herselve known to ambulance crew.
4. Uninterrupted handover by paramedic.
   Member of resuscitation team notes handover information on whiteboard.

S

- Patient's name and date of birth
- Onset time of cardiac arrest
- Witnessed or unwitnessed arrest
- BLS before ambulance arrival?
- AED shocks administered? Initial rhythm in ambulance
- Duration of CPR and number of defibrillations

Medication handover:

- Total amount of amiodarone administered
- Total amount of adrenaline administered and when last given
- Other medication administered

B

- Relevant history
- Medication

A

- Airway
- End-tidal CO_2
- In the case of ROSC: AVPU, respiratory sufficiency, SpO_2, heart rate and blood pressure
- Diagnosis/reversible cause and reason for transport

R

- What action is required

5. Rhythm check by ambulance crew, then resume BLS (the patient is still on stretcher)
6. Start of two-minute block by hospital team, involving:
   A) Disconnecting ventilator and defibrillator (unless pacing) by ambulance crew
   B) Moving the patient to the hospital bed: paramedic coordinates
   C) Resuscitation team: resume chest compressions and ventilation, remove clothing, connect hospital defibrillator
   D) Paramedic giving handover: communicate additional handover details to team leader (if necessary), add to whiteboard as needed, provide printout from ambulance defibrillator, give details of any family present
7. After 5-10 minutes of CPR by the resuscitation team, the team leader gives a summary including additional information, crosscheck by paramedic. Team members ask any relevant questions.

4. Practical points for consideration

To ensure successful implementation of this guideline, the following issues need to be addressed:

- This guideline must be familiar to all chain partners, i.e. all emergency medical services and all specialties involved in hospital care.
- Implement the guideline in your local situation: make sure the forms are available where the pre-alert is received and give the whiteboard a clearly visible position on the wall in the emergency room receiving area.
- Awareness of this guideline is not enough for implementation: successful implementation requires specific education and training, preferably through frequent, short, repetitive in-situ simulation training with partners in the chain of survival.
- Try to stick to the structure as much as possible. The order of the ambulance pre-alert corresponds to the hospital form. If a different order is used, this will lead to confusion. Adding items to the handover also causes confusion and delays in the process.
- Information transfer is a critical process: do not permit disruptions or interruptions during the telephone pre-alert or verbal handover.
- The receiving hospital is responsible for providing a clearly signposted route and/or guiding the presenting ambulance crew to the appropriate receiving area.
- The information from the pre-alert phone call can be written on the whiteboard in advance, so that the information only needs to be confirmed and completed during the verbal handover.
- The information from the handover, the ambulance form, and the defibrillator printout should be included in the patient's file at the receiving hospital.

5. References

Stokoe E. The conversational racetrack. In: Stokoe E. Talk: The Science of Conversation. London: Robinson; 2018. p: 1-19.

Purdy E, Alexander C, Shaw R, Brazil V. The team briefing: setting up relational coordination for your resuscitation. Clin Exp Emerg Med. 2020 March; 7(1):1-4.

De Graaf C, Beesems SG, Koster RW. Time of on-scene resuscitation in out of-hospital cardiac arrest patients transported without return of spontaneous circulation. Resuscitation. 2019;138:235-242.

Müller M, Jürgens J, Redaèlli M, Klingberg K, Hautz WE, Stock S. Impact of the communication and patient hand-off tool SBAR on patient safety: a systematic review. BMJ Open. 2018;8:e022202.

Thakore S, Morrison W. A survey of the perceived quality of patient handover by ambulance staff in the resuscitation room. Emerg Med J. 2001;18:293-6.

Hovenkamp GT, Olgers TJ, Wortel RR, Noltes ME, Dercksen B, Ter Maaten JC. The satisfaction regarding handovers between ambulance and emergency department nurses: an observational study. Scand J Trauma Resusc Emerg Med. 2018;26:78.

Ebben RH, van Grunsven PM, Moors ML, Aldenhoven P, de Vaan J, van Hout R, van Achterberg T, Vloet LC. A tailored e-learning program to improve handover in the chain of emergency care: a pre-test post-test study. Scand J Trauma Resusc Emerg Med. 2015;23:33.

Waldron R, Sixsmith DM. Emergency physician awareness of prehospital procedures and medications. West J Emerg Med. 2014;15:504-10.

Knutsen GO, Fredriksen K. Usage of documented prehospital observations in secondary care: a questionnaire study and retrospective comparison of records. Scand J Trauma Resusc Emerg Med. 2013;21:13.

Talbot R, Bleetman A. Retention of information by emergency department staff at ambulance handover: do standardised approaches work? Emerg Med J. 2007;24:539-42.

Dutch Resuscitation Council, Guidelines for resuscitation in the Netherlands 2021

https://www.vmszorg.nl/praktijkvoorbeelden-en-tools/sbar-methode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