

# Automated cardiac arrest detection using a wristband: first evaluation of false positive alarms during daily life use

R. EDGAR<sup>1</sup>, K. EBRAHIMKHEIL<sup>2</sup>, N. SCHOLTE<sup>3</sup>, R. BEUKEMA<sup>1</sup>, M. BROUWER<sup>1</sup>, A. CETINYUREK-YAVUZ<sup>1</sup>, E. RONNER<sup>4</sup>, E. BOERSMA<sup>3</sup>, P. STAS<sup>2</sup>, N. VAN ROYEN<sup>1</sup>, J. BONNES<sup>1</sup>

<sup>1</sup> Radboud University Medical Center, the Netherlands. <sup>2</sup> Corsano Health, the Netherlands. <sup>3</sup> Erasmus University Medical Center, the Netherlands. <sup>4</sup> Reinier de Graaf hospital, the Netherlands.

**DETECT**

## INTRODUCTION

- Automated cardiac arrest detection using wearable technology is one of the emerging technological innovations in resuscitation science<sup>1-4</sup>.
- The DETECT-project was established to develop a wristband with this technology. In DETECT-1, a photoplethysmography (PPG) algorithm for circulatory arrest detection was developed using patient data, achieving 98% sensitivity<sup>1</sup>.
- Implementation in daily life with automated deployment of rescuers requires very few false positive cardiac arrest alarms.

## METHODS

- Healthy adult volunteers wore the PPG-wristband during exercising.
- Circulatory arrests were induced by blood pressure cuff inflations at the same arm as where the wristband was applied (Figure 1).
- The developed PPG-algorithm was used to study the sensitivity for circulatory arrest detection and false positive alarms. The algorithm had to decide within 5 seconds whether to trigger an alarm.

## AIM

This study evaluates:

- The frequency of false positive cardiac arrest alarms in healthy volunteers during exercise.
- The sensitivity for the detection of circulatory arrest events induced by blood pressure cuff inflation at the same arm as where the wristband is applied.

## CONCLUSION

False positive cardiac arrest alarms were infrequent in this first evaluation during daily life. Exercise did not increase frequency in false positive alarms in this study, compared to DETECT-1.

Sensitivity for induced circulatory arrest detection was excellent.

Further study is needed to evaluate false positive alarms across a broader spectrum of daily activities.

## RESULTS

### Study participants

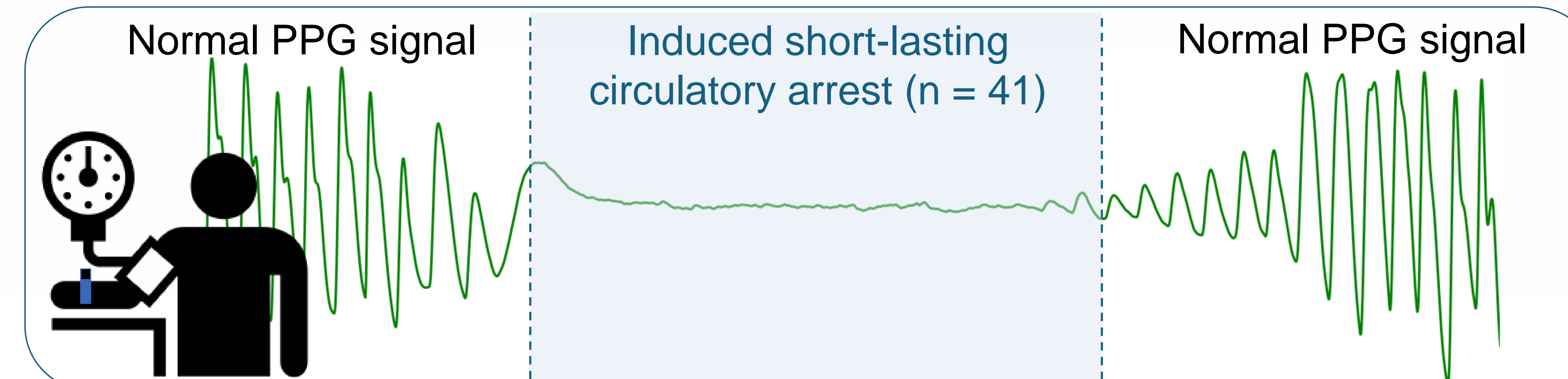


### Study procedures



### Results

PPG data (hours)	285h
Sensitivity	100%
PPV	95%
False positives	2



**Figure 1.** Study procedures and performance of the circulatory arrest detection algorithm in healthy, exercising volunteers. Blood pressure cuff inflation resulted in flattening of the PPG signal mimicking circulatory arrest.

The wristband was worn by 33 volunteers. In total, 41 circulatory arrest events were induced.

The PPG-algorithm detected all induced events correctly, yielding a sensitivity of 100% (95% CI 89-100%).

Among the participants, 2 false positive alarms occurred in one participant, resulting in a positive predictive value of 95% (95% CI 83-99%). When the detection interval was adjusted to 30 seconds, both false positive alarms eliminated.

## CONTACT INFORMATION

✉ [roos.edgar@radboudumc.nl](mailto:roos.edgar@radboudumc.nl)

🌐 [www.detect-study.com](http://www.detect-study.com)

✂ @study\_DETECT

## REFERENCES

- Edgar, R., et al. "Automated cardiac arrest detection using a photoplethysmography wristband: ..." *The Lancet Digital Health* (2024): e201-e210.
- Khalili, M., et al. "Detecting cardiac states with wearable photoplethysmograms ..." *Scientific Reports* (2024): 23185.
- Hup, R.G., et al. "Rationale and design of the BECA project: ..." *Resuscitation plus* (2024): 100576.
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## SCAN & READ

Read our DETECT-1 article, published in Lancet Digital Health.

