# USING BODY-WORN CAMERAS IN MEDICAL RESEARCH TO IMPROVE RESUSCITATION OUTCOMES

**HOW THE UNIVERSITY OF EDINBURGH'S RESUSCITATION RESEARCH GROUP (RRG) IS GAINING CRITICAL INSIGHTS INTO EMERGENCY CALL HANDLER INTERACTIONS AND DEFIBRILLATOR USE THROUGH VB400 BODY-WORN CAMERAS**


## THE CHALLENGE

Heart attacks and cardiac arrests don't just occur in a hospital context. They can happen anywhere - in the street, on a train, at a bus stop. Often, members of the public must administer potentially life-saving treatment to a loved one or stranger, to improve their chances of survival before an ambulance reaches them. As part of this process, an emergency call handler may instruct one bystander to perform Cardiopulmonary Resuscitation (CPR) while another one retrieves, and uses, a Public Access Defibrillator (PAD) to shock the victim's heart back into a regular rhythm.

Unfortunately, despite great improvements in public education and awareness, survival rates from out-of-hospital resuscitations in the UK still hover around the 10% mark[1]. Many factors can influence this rate, such as the duration of CPR and the location of the patient[2]. However, one of the most significant factors that determines survival is the gap between performing CPR and administering shocks via a PAD - the so-called "pre-shock pause." Research shows that a patient's survival rate drops by 18% for each 5 second interval during which chest compressions or electric shocks are not administered[3].

While a lot of attention has been paid to how bystanders perform CPR, relatively little empirical research has focused on how they use PADs, and how they interact with the call handlers who guide them through the process. To address these gaps in the research, the University of Edinburgh's Resuscitation Research Group (RRG), a multidisciplinary group focusing solely on cardiac arrest outcomes, decided to test how participants handle out-of-hospital PAD deployments in a laboratory context.

The researchers needed an easy way to record, and store, high-quality first-person video and audio from their participants' perspective - which is why they trusted the Motorola Solutions VB400 body-worn camera and VideoManager backend software.

### CUSTOMER PROFILE

**Organisation**
The University of Edinburgh's Resuscitation Research Group (RRG)

**Industry**
Healthcare and academic research

**Location**
Edinburgh, UK

**Motorola Solutions Products**

- VB400 body-worn cameras
- Cloud-based VideoManager software

**"We're using body-worn video from both an education and research perspective."**

Dr James Nicholson, Academic Foundation Doctor

1 https://www.bhf.org.uk/what-we-do/policy-and-public-affairs/transforming-healthcare/out-of-hospital-cardiac-arrests
2 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4129855/ and https://www.frontiersin.org/articles/10.3389/fphys.2022.834352/full
3 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3138806/

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THE UNIVERSITY of EDINBURGH

**CASE STUDY**
RESUSCITATION RESEARCH GROUP

**"The VB400 with VideoManager allows us to locate our simulation in real world settings, and the team can access footage securely from remote working locations. The platform really makes the program. Without VideoManager, none of this would be possible."**

Dr Gareth Clegg, Principal Investigator

## SIMULATING OUT-OF-HOSPITAL RESUSCITATION

The RRG aimed to create an environment that mirrored a real out-of-hospital cardiac arrest as closely as possible. In a conference room at the Queen's Medical Research Institute (QMRI), pairs of participants were presented with a "patient" (a life-size manikin) and a phone pre-dialled with the emergency number - they were then told they should proceed as they would in a real emergency.

A researcher acting as a call handler was in an adjoining room, following a script determined by the Medical Priority Dispatch System™ (MPDS), a global standard for emergency call-taking. Throughout the experiment, participants were instructed to confirm the patient was not breathing, perform CPR, and retrieve a simulated PAD from a nearby reception area.

## USING THE VB400 BODY-WORN CAMERA TO CAPTURE HIGH-QUALITY, FIRST-PERSON VIDEO

Normally, academic studies use voice recorders or static cameras to capture participant data. However, this was not possible for the RRG - because the experiment involved a participant leaving the conference room to retrieve a PAD in order to maximise simulation authenticity, relying solely on a fixed camera in the conference room would result in missing crucial elements of the timeline.

Members of the RRG had prior experience working with Motorola Solutions body-worn cameras, so choosing the VB400 to securely capture high-quality video for the study was a natural choice. "We needed that first-person perspective that a body-worn camera provides," explains Dr James Nicholson, an academic foundation doctor with the University of Edinburgh. "We wanted to look at why bystanders struggle to successfully administer CPR and PADs - the advantage of the body-worn cameras is that we can identify the exact moment where things go wrong, and the reasons why they do. Once we've identified those errors, we can work on ways to prevent them from happening in the first place."

In addition to equipping the two participants with the VB400s - using a Klick Fast harness, to ensure the cameras were securely mounted throughout the experiment - the call handler also wore a VB400. The camera's dual microphones enabled the group to capture crucial dialogue and assemble a full transcript of the interaction between the bystanders. "The cameras were very easy to use," says Eilish Murphy, a 4th year Medical student at the University of Edinburgh. "The quality of the video was great - we could see and hear everything that happened."

## ANALYSING FOOTAGE WITH VIDEOMANAGER

Once the research group finished collecting their experimental data, they turned to the VB400's accompanying backend software, VideoManager, to handle it. Using VideoManager's powerful playback functionality, the team could carry out a frame-by-frame analysis of their footage to identify statistical trends across participants. "We use the videos quite intensively to understand whether what we're seeing is representative of real mental stress," says Dr Nicholson, whose work focuses on human error and performance. He was also impressed with VideoManager's built-in editing capabilities: "My colleagues who reviewed the data were resuscitation experts, but they weren't all familiar with the video tools themselves. I clipped the videos beforehand, which saved us time and enabled the group to focus on what actually mattered."

The RRG chose to deploy their instance of VideoManager in the cloud, so the team could access sensitive data from anywhere. "The RRG spans multiple organisations, so it can get tricky if software is based on one server. Being able to access videos remotely was very useful," notes Dr Nicholson. "Because VideoManager is browser-based, I could access it on any computer and know I was working in a secure environment which had ethical approval." VideoManager's configurable password policies ensured only authorised researchers could log into the system, and the system protected all videos - both in-transit and at-rest - using AES-256 encryption to ensure participants' data was secure at every stage.

## SUMMARY

Motorola Solutions VB400 body-worn cameras allowed the University of Edinburgh's Resuscitation Research Group to capture key insights into bystander behaviour when performing CPR. Once the RRG publish their findings in prestigious academic journals, the information will be leveraged to improve public training resources around CPR. And by using VideoManager to securely store and manage data in the cloud, the group could protect the privacy of their participants while also enabling collaboration between different organisations.

While the group used body-worn technology in a completely novel way, the benefits they saw from the solution - leveraging first-person HD video to improve training and gain operational insights - can apply to any organisation or agency which chooses the VB400.

**Benefits:**

- Easy-to-use hardware which can be deployed quickly and requires minimal training
- High-quality video and intuitive playback controls allow researchers to undertake granular reviews of participant decisions and interactions
- Unobtrusive camera design and flexible mounting options accommodate different participant body types and ensure all key moments are captured during the experiment
- Secure, cloud-based backend software allows multiple researchers to review and categorise footage simultaneously while still complying with ethics requirements and protecting participant anonymity

**"The entire solution is quick to deploy, easy to use, and completely secure."**

Dr James Nicholson, Academic Foundation Doctor

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