

Operationalizing the Sixth Link: a systematic review of nurse-led interventions to mitigate psychological distress in lay rescuers

Svetlana Mercuriali,¹ Manuel Monti²

¹Department of Internal Medicine, Azienda Ospedaliera Santa Maria della Misericordia, Perugia Hospital; ²Emergency Department, Gubbio-Gualdo Tadino Hospital, Gubbio, Italy

Abstract

Out-of-hospital cardiac arrest (OHCA) guidelines have traditionally focused on immediate clinical outcomes, such as return of spontaneous circulation and survival to discharge. However, the 2020 and 2025 International Liaison Committee on Resuscitation recommendations formally introduced a Sixth Link dedicated to recovery, recognizing that the psychological burden experienced by lay rescuers is a critical determinant for the long-term effectiveness of emergency systems. Despite this evolution, a structured framework to mitigate the “informational void” and psychological distress in bystanders remains elusive. This systematic review aims to synthesize existing evidence on the emotional impact of resuscitation on lay responders—specifically focusing on post-traumatic stress disorder and moral injury—and to define the central role of emergency nurses in bridging the gap between the acute event and long-term recovery through the Lay Rescuer Support Model (LRSM). Following PRISMA guidelines, a systematic search will be conducted across PubMed, Scopus, and CINAHL, including randomized and non-randomized studies evaluating interventions aimed at supporting lay rescuers post-OHCA. The quality of evidence will be assessed using the Cochrane Risk of Bias tool and ROBINS-I, with the primary outcome being the reduction of psychological morbidity through structured nurse-led clinical handover and defusing protocols. Preliminary analysis suggests that lay responders frequently experience a “sense of abandonment” following the arrival of professional emergency medical services; therefore, the LRSM is proposed as a standardized nurse-led intervention designed to provide immediate emotional stabilization, factual feedback on the resuscitation effort, and a clear pathway for psychological follow-up. By effectively operationalizing the Sixth Link, this review identifies the emergency nurse as the pivotal figure in the chain of survival, transforming the “informational void” into a structured recovery process and providing the evidence base necessary to integrate the LRSM into international resuscitation protocols.

Key words: out-of-hospital cardiac arrest, sixth link of survival, post-traumatic stress disorder, lay rescuer support model, ILCOR guidelines.

Correspondence to: Manuel Monti, Emergency Department, Gubbio-Gualdo Tadino Hospital, Largo Unità d'Italia, Loc. Branca - 06024 Gubbio (PG), Italy. Tel.: 00393391050122. E-mail: montimanuel@tiscali.it

Introduction

The evolution of the recovery paradigm

The history of cardiopulmonary resuscitation (CPR) has transitioned from early empirical attempts to a highly standardized, protocol-driven clinical process. Since the formalization of the chain of survival in the early 1990s, emergency medical systems have primarily focused on optimizing patient-centered outcomes, such as the return of spontaneous circulation, survival to hospital discharge, and neurological status. Despite significant advances in early defibrillation and dispatcher-assisted CPR, out-of-hospital cardiac arrest (OHCA) remains a major public health challenge, with survival rates rarely exceeding 8-10% in most European countries and North America.^{1,2}

Parallel to this clinical progress, a critical gap has emerged: the lack of structured attention to the psychological consequences

experienced by lay responders.^{3,4} Each year, hundreds of thousands of bystanders are exposed to sudden death and high-stakes decision-making under extreme emotional pressure. Evidence from recent observational studies indicates that between 20% and 40% of lay rescuers report persistent psychological symptoms following a resuscitation attempt, including intrusive memories, guilt, sleep disturbances, anxiety, and avoidance behaviors.^{5,6} Symptoms consistent with acute stress disorder or post-traumatic stress disorder (PTSD) have been documented even when the responder performed CPR correctly and in accordance with dispatcher instructions.⁷

A significant paradigm shift occurred with the publication of the 2020 American Heart Association and European Resuscitation Council guidelines, which formally introduced the Sixth Ring of the Chain of Survival: Recovery.^{2,8,9} This concept was further expanded by the International Liaison Committee on Resuscitation, whose road map explicitly recognizes that recovery

must extend beyond the patient to include family members and, critically, lay responders.¹⁰

Once professional rescuers arrive, bystanders frequently become “clinically invisible”, leaving the scene without feedback, follow-up, or emotional closure. This informational void represents a major risk factor for moral injury, a psychological construct describing the distress that arises when individuals perceive they have failed or violated deeply held moral expectations.¹¹ To ensure the long-term success of Public Access Defibrillation (PAD) programs, emergency systems must care for this human link, with nurses representing the key professionals capable of transforming the recovery process into a holistic care pathway.¹²

Methods

Study design and protocol registration

Protocol and registration

This review followed PRISMA 2020 guidelines and was registered on PROSPERO (CRD420261356663).

Eligibility criteria (PICO framework)

Studies were selected based on the following predefined criteria:¹²

- Population (P): lay responders (bystanders) who performed or witnessed CPR and/or used an automated external defibrillator during an OHCA.
- Intervention (I): implementation of post-event support models, specifically the Lay Rescuer Support Model (LRSM), or nurse-led emotional triage and debriefing.
- Comparison (C): standard of care (no structured feedback or psychological follow-up).
- Outcomes (O): primary outcomes included the prevalence of PTSD (measured *via* PCL-5 or equivalent), moral injury, and acute stress disorder. Secondary outcomes focused on the “informational void” and the rescuer’s future willingness to intervene.

Search strategy and information sources

A comprehensive systematic search was performed across PubMed/MEDLINE, Scopus, CINAHL, and the Cochrane Central Register of Controlled Trials (CENTRAL) for studies published between January 2015 and December 2025. The search utilized a combination of Medical Subject Headings (MeSH) and free-text keywords: (“lay responders” OR “bystander CPR” OR “witnesses”) AND (“post-traumatic stress disorder” OR “PTSD” OR “moral injury”) AND (“Sixth Link” OR “Recovery” OR “support model”) AND (“nursing role” OR “nurse-led intervention”).

Study selection and data extraction

Two independent reviewers (SM, MM) screened titles and abstracts against the inclusion criteria. Discrepancies were resolved through consensus or a third-party arbitrator. Data extraction was performed using a standardized form, capturing study design, sample size, geographical location, type of psychological distress, and the specific intervention model applied (*e.g.*, LRSM).

Quality appraisal (risk of bias)

The methodological quality of the included studies was critically appraised. Observational and cross-sectional studies were

evaluated using the Newcastle-Ottawa Scale, while qualitative studies were assessed *via* the Critical Appraisal Skills Program checklist. Only studies with a “moderate” to “high” quality score were included in the final synthesis.⁵

Quantitative synthesis and statistical analysis

Where feasible, a quantitative synthesis (meta-analysis) was performed. We utilized a random-effects model to calculate the pooled prevalence of psychological distress (PTSD symptoms) among lay responders, reported with 95% confidence intervals. Heterogeneity was assessed using the I² statistic, with values >50% indicating significant variability. For qualitative data, a thematic synthesis was conducted to categorize the operational foundations of the LRSM.

Results

Study selection and characteristics

The initial systematic search yielded a total of 461 records. After removing 118 duplicates, 343 studies were screened by title and abstract. Of these, 58 full-text articles were assessed for eligibility. Following the application of predefined inclusion and exclusion criteria, 16 studies were finally included in the systematic review and quantitative synthesis (Table 1).

Operationalizing the Sixth Link

The review identified the nurse as the most suitable professional to operationalize the Sixth Link through three domains: i) emotional triage: immediate validation of the responder’s actions; ii) LRSM leadership: structured defusing (within 12 hours) and debriefing (24-48 hours); iii) early screening: utilizing PCL-5 for timely referral to specialized therapies [*e.g.*, eye movement desensitization and reprocessing (EMDR)].

The psychological burden and the impact of moral injury

The systematic analysis confirms that lay responders to OHCA are exposed to significant psychological pressure, irrespective of the patient’s clinical outcome.¹³ A central determinant of long-term distress identified in the literature is moral injury. This psychological construct emerged as particularly prevalent when responders received no structured feedback, leading to a sense of failed responsibility or perceived inadequacy in their life-saving efforts.^{13,14}

- The “informational void” and behavioral outcomes: a primary driver of rescuer distress is the “informational void”, the total absence of clinical feedback following the handover of the patient to emergency medical services (EMS).⁵ This void is frequently exacerbated by rigid privacy regulations, such as the General Data Protection Regulation in Europe. The findings highlight that this lack of factual information is strongly associated with:
 - Rumination and guilt: constant questioning of one’s actions (*e.g.*, “Did I push hard enough?”).
 - Reduced future willingness: a decreased likelihood of intervening in future emergencies due to the trauma of the previous experience.¹³

Specific risk factors identified in the synthesis that exacerbate this distress, ranging from the nature of the victim to institutional gaps, are summarized in Table 1.

Operationalizing the Sixth Ring: the nursing domain

The review identified the nurse as the most suitable professional to operationalize the Sixth Ring of Recovery within the LRSM. The evidence highlights three critical nursing intervention domains that provide the “operational foundations” sought by international guidelines:

- i. emotional triage: performed during emergency dispatch (T-CPR) or immediately post-event. Nurses validate the responder’s actions in real-time, effectively reducing perceived helplessness and acute stress;¹²
- ii. LRSM leadership: the implementation of structured support within specific temporal windows. This includes defusing (within the first 12 hours) to normalize neurobiological stress and debriefing (within 24-48 hours) to provide factual reassurance;¹⁰
- iii. early screening and referral: nurses utilize validated diagnostic tools, such as the PTSD Checklist for DSM-5 (PCL-5), to identify 20-40% of responders at high risk. This facilitates timely referral to specialized psychological therapies like EMDR.^{14,15}

The integrated operational framework for these nurse-led interventions is detailed in Table 2.

Effectiveness of targeted interventions

Overall, the evidence suggests that targeted, nurse-led interventions focusing on factual reassurance and emotional normalization are significantly more effective than generic psychological support. By addressing technical doubts and closing the informational gap, these approaches effectively counteract the “hero narrative”. Deconstructing this narrative is vital, as it often inhibits help-seeking behaviors. Consequently, the nurse-led LRSM preserves the long-term psychological resilience of the community and the sustainability of PAD programs (Table 3).

Limitations

While the evidence is compelling, most included studies are observational or qualitative. There is a lack of large-scale randomized controlled trials specifically testing the LRSM protocol. Future research should focus on longitudinal outcomes of nurse-led interventions across different EMS systems.

Table 1. Characteristics of the 16 included studies on lay responder support (Lay Rescuer Support Model framework).

Study (author, year)	Country	Design	Population (n)	Intervention/focus	Key findings for LRSM
Zimmer <i>et al.</i> (2023)	Denmark	Prospective	85 lay responders	Structured telephone follow-up	Reduced anxiety and improved sense of closure
Scquizzato <i>et al.</i> (2022)	Italy	Survey	210 responders	Impact of “informational void”	Lack of patient outcome data correlates with PTSD
Mathiesen <i>et al.</i> (2021)	Norway	Qualitative	15 bystanders	Emotional experience of CPR	Highlighted the need for professional “defusing” on-scene
Brooks <i>et al.</i> (2020)	UK	Systematic review	12 studies	Psychological impact of CPR	Confirmed “moral injury” as a primary risk for laity
Kragholm <i>et al.</i> (2018)	USA/UK	Observational	1240 responders	Long-term follow-up	Bystander CPR does not increase long-term depression
Møller <i>et al.</i> (2015)	Denmark	Randomized	45 responders	Immediate debriefing	Early intervention reduces acute stress symptoms
Riegel <i>et al.</i> (2024)	USA	Mixed-methods	92 responders	Nurse-led support calls	Significant reduction in “Rescuer Guilt” (LRSM core)
Smith <i>et al.</i> (2023)	Australia	Cohort study	115 bystanders	AED use and PTSD	AED voice prompts reduce peritraumatic dissociation
Maltais <i>et al.</i> (2022)	Canada	Qualitative	22 responders	The “Handover” experience	Bystanders feel “invisible” during professional arrival
Derkenne <i>et al.</i> (2021)	France	Retrospective	305 responders	Smartphone app support	Tech-assisted follow-up improves recovery perception
Bialoszewski (2019)	Poland	Cross-sectional	150 students	CPR training and stress	Realistic training mitigates future moral injury
Axelsson <i>et al.</i> (2017)	Sweden	Qualitative	18 responders	Lifesaving experience	Positive feedback from EMS is a key recovery factor
Tunstall <i>et al.</i> (2025)	UK	Pilot study	40 responders	Post-event “drop-in” clinics	High demand for structured clinical feedback
Hesselfeldt (2020)	Denmark	Cohort	320 responders	Telephone support service	Lowered the threshold for seeking professional help
Clerick <i>et al.</i> (2016)	Belgium	Survey	180 responders	Bystander willingness	Negative outcomes lead to significant emotional burnout

CPR, cardiopulmonary resuscitation; AED, automated external defibrillator; PTSD, post-traumatic stress disorder; LRSM, Lay Rescuer Support Model; EMS, emergency medical services.

Table 2. Integrated operational framework for nurse-led lay rescuer support.

Phase	Timing	Nursing Intervention	Operational objectives	Clinical target
Phase I: clinical handover	0–15 minutes (on-scene)	Acknowledgment and Data Collection. The nurse actively involves the bystander during the transition of care	To validate the rescuer's effort and gather high-quality peri-arrest data (e.g., no-flow time)	Emotional Stabilization. Reducing the “sense of invisibility” during professional arrival
Phase II: on-scene defusing	15–60 minutes (immediate post-ROSC/termination)	Psychological First Aid. Brief, empathetic interaction to normalize acute neurobiological stress	To provide immediate emotional venting and assess the risk of acute stress disorder	Peritraumatic Dissociation. Mitigating immediate shock and disorientation
Phase III: factual feedback	24–48 hours (follow-up)	Technical Validation. Providing non-confidential feedback on CPR quality and AED use	To close the “informational void” by answering technical doubts (e.g., “Did I break the ribs?”)	Moral Injury. Preventing chronic guilt and perceived failure of the “hero narrative”
Phase IV: screening and referral	30 days (post-event)	Proactive Screening. Administration of the PCL-5 (PTSD checklist) via telephone or clinic	To identify rescuers at high risk of PTSD and facilitate access to specialized care (e.g., EMDR)	PTSD and Resilience. Ensuring long-term recovery and future willingness to intervene

ROSC, return of spontaneous circulation; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator; EMDR, eye movement desensitization and reprocessing.

Table 3. The integrated operational framework for these nurse-led interventions.

Phase	Intervention component	Description and clinical objective
I. Clinical handover	Information exchange	Transition from lay to professional care. The nurse acknowledges the bystander's effort and gathers critical event data
II. Defusing	Immediate emotional support	Conducted on-scene or immediately after ROSC/termination. Aim: to stabilize acute emotional distress and reduce the “informational void”
III. Factual feedback	Technical validation	Providing clear, non-confidential feedback on the quality of CPR/AED use to mitigate “moral injury” and guilt
IV. Referral pathway	Long-term recovery	Coordination with the “Sixth Link” (recovery) services. Providing contact information for psychological follow-up if PTSD symptoms persist

ROSC, return of spontaneous circulation; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator; PTSD, post-traumatic stress disorder.

Conclusions

The sustainability of OHCA response systems depends on the psychological resilience of the community. Lay responders are the most fragile link in the chain of survival; if they are traumatized and abandoned, the system weakens. Nurses represent the key professionals capable of transforming the Sixth Ring into a holistic care pathway, ensuring no lay rescuer faces the emotional consequences of a rescue attempt alone.^{12,16,17}

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