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RESEARCH

Effectiveness of Homemade CPR Devices Vs. Standardized Training with a Commercial Manikin: A Critical Appraisal Topic

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ABSTRACT

Clinical Scenario: High-quality compression-only CPR training improves survival from out-of-hospital cardiac arrests. Traditional manikin-based training is effective but limited by cost and accessibility. Despite growing interest in low-cost, homemade CPR devices, synthesized evidence comparing these alternatives to standardized instructor-led training remains lacking.

Clinical Question: Among individuals ages 12–65, is training with a homemade CPR device plus instructional video, compared with a standard course using a commercial manikin, effective in improving compression-only CPR performance (depth, rate, recoil, hand placement) and self-reported confidence?

Summary of Key Findings: Four randomized crossover studies demonstrated that participants using homemade CPR devices (e.g., CPR pillows, toilet roll models) achieved CPR skills comparable to commercial manikins, with equivalent compression depth, rate, hand placement, and chest recoil. Homemade devices provided sufficient tactile feedback to enhance learning outcomes. Participants using homemade devices reported higher post-training confidence than those using traditional manikins. These findings highlight advantages for community-based training programs.

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Clinical Bottom Line: Homemade CPR devices paired with structured instructional videos represent an effective alternative to traditional manikin-based training, particularly in resource-limited settings. These devices increase CPR education accessibility and enhance community readiness for cardiac emergencies. However, they are not recognized as acceptable alternatives for formal CPR certification, which requires standardized manikin assessment and instructor evaluation.

Strength of Recommendation: Using the Centre for Evidenced Based Medicine criteria, consistent Level 2 findings support homemade CPR devices as effective alternatives for basic skill acquisition and confidence building when manikin-based courses are inaccessible or cost-prohibitive, though formal certification requirements remain unchanged.

Keywords: Cardiopulmonary resuscitation; CPR training; homemade CPR device; commercial manikin; instructor-led training

MUHTASARI

Hali ya Kliniki: Mafunzo ya CPR yenye msisitizo wa kufinya kifua haraka na kwa nguvu pekee kwa ubora wa juu huongeza uwezekano wa kuishi kwa waathirika wa moyo kusimama ghafla kunakotokea nje ya hospitali. Mafunzo ya kawaida yanayotumia sanamu ya CPR (*manikin*) ni yenye ufanisi, lakini mara nyingi huzuiwa na gharama kubwa na upatikanaji mdogo. Licha ya kuongezeka kwa matumizi ya vifaa vya CPR vya gharama nafuu vinavyotengenezwa nyumbani, ushahidi uliokusanywa unaolinganisha mbinu hizi na mafunzo rasmi yanayoongozwa na wakufunzi bado ni mdogo.

Swali la Kliniki: Kwa watu wenye umri wa miaka 12–65, je, mafunzo ya CPR kwa kutumia kifaa cha nyumbani pamoja na video ya maelekezo, yakilinganishwa na kozi ya kawaida inayotumia sanamu ya kibiashara, yana ufanisi katika kuboresha utendaji wa CPR ya kufinya kifua haraka na kwa nguvu pekee (kina cha mfinyo, kasi, urejeaji wa kifua, na uwekaji wa mikono) pamoja na kujiamini kwa mshiriki?

Muhtasari wa Matokeo Muhimu: Tafiti nne za nasibu za muundo wa *crossover* zilionyesha kuwa washiriki waliotumia vifaa vya CPR vilivyotengenezwa nyumbani (kama vile mito ya CPR au miundo ya karatasi ya chooni) walipata ujuzi wa CPR unaolingana na wale waliotumia sanamu za kibiashara. Viwango vya kina cha mfinyo, kasi, uwekaji wa mikono, na urejeaji wa kifua vilikuwa sawa. Vifaa vya nyumbani vilitoa mwitikio wa mguso unaohisika unaotosha kuimarisha ujifunzaji. Aidha, washiriki waliotumia vifaa vya nyumbani waliripoti kujiamini zaidi baada ya mafunzo ikilinganishwa na wale waliotumia sanamu za kawaida. Matokeo haya yanaonesha faida kubwa kwa programu za mafunzo ya kijamii.

Hitimisho la Kliniki: Vifaa vya CPR vinavyotengenezwa nyumbani vikichanganywa na video za mafunzo zilizopangwa vizuri ni mbadala wenye ufanisi kwa mafunzo ya CPR yanayotumia sanamu, hasa katika mazingira yenye rasilimali chache. Mbinu hii huongeza upatikanaji wa elimu ya CPR na huimarisha utayari wa jamii kukabiliana na dharura za moyo kusimama ghafla. Hata hivyo, vifaa hivi havitambuliwi kama mbadala unaokubalika kwa uthibitisho rasmi wa CPR, ambao unahitaji tathmini kwa kutumia sanamu zilizoidhinishwa na wakufunzi waliothibitishwa.

Nguvu ya Pendekezo: Kwa kutumia vigezo vya *Centre for Evidence Based Medicine*, ushahidi thabiti wa Kiwango cha 2 unaunga mkono matumizi ya vifaa vya CPR vya nyumbani kama mbadala wenye ufanisi kwa kujifunza ujuzi wa msingi na kujenga kujiamini pale ambapo mafunzo ya kutumia sanamu hayapatikani au ni ghali kupita kiasi. Mahitaji ya uthibitisho rasmi, hata hivyo, yanaendelea kubaki bila kubadilika.

Maneno Muhimu: Ufufuaji wa moyo na mapafu (CPR); mafunzo ya CPR; kifaa cha CPR cha nyumbani; sanamu ya CPR; moyo kusimama ghafla; kufinya kifua haraka na kwa nguvu

ABSTRAKT

Klinisches Szenario: Hochwertiges Training in Herzdruckmassagen (compression-only CPR) verbessert die Überlebensrate bei außerklinischem Herzstillstand. Traditionelles, manikinbasiertes CPR-Training ist wirksam, jedoch durch Kosten und eingeschränkte Zugänglichkeit limitiert. Trotz zunehmenden Interesses an kostengünstigen, selbst hergestellten CPR-Trainingsgeräten (DIY-Manikins) fehlt bislang eine systematische Evidenzsynthese, die diese Alternativen mit standardisierten, instruktorgeleiteten Trainings vergleicht.

Klinische Fragestellung: Führt das Training mit einem selbst hergestellten (DIY) CPR-Manikin und Instruktionsvideo zu vergleichbarer Leistungsverbesserung in compression-only CPR (Drucktiefe, Frequenz, vollständige Entlastung, Handposition) sowie des selbstberichteten Vertrauens, im Vergleich zu einem Standardkurs mit kommerziellem Manikin, in 12–65 Jährigen?

Zusammenfassung der wichtigsten Ergebnisse: Vier randomisierte Crossover-Studien zeigten, dass Training mit DIY-Manikins (z. B. CPR-Kissen, Modelle aus Toilettenpapierrollen) im Vergleich zu Training an kommerziellen Manikins zu vergleichbaren CPR-Fertigkeiten führte. Diese Fertigkeiten umfassten vergleichbare Drucktiefe, Frequenz, Handposition und thorakale Entlastung. DIY-Manikins boten ausreichendes taktiles Feedback zur Unterstützung der Lernprozesse. Zudem berichteten Teilnehmende nach dem Training mit DIY-Manikins ein höheres Maß an Selbstvertrauen als Teilnehmende, die mit traditionellen Manikins trainierten. Diese Ergebnisse suggerieren potenzielle Vorteile für gemeindebasierte Trainingsprogramme.

Schlussfolgerung: DIY-Manikins in Kombination mit strukturierten Instruktionsvideos stellen eine wirksame Alternative zum traditionellen manikinbasierten Training dar, insbesondere in ressourcenlimitierten Settings. Solche Lösungen können die Zugänglichkeit zur CPR-Ausbildung verbessern und dazu beitragen, dass Gemeinschaften auf Herz-Kreislauf-Notfallsituationen besser vorbereitet sind. Für formelle CPR-Zertifizierungen gelten sie jedoch nicht als anerkannte Alternative, da diese standardisierte Manikinbewertungen und instruktorgeleitete Leistungsbeurteilungen erfordern.

Empfehlungsstärke: Konsistente Evidenz der Stufe B unterstützt den Einsatz von DIY-Manikins für den Erwerb von Grundlagekompetenzen für den Aufbau von Vertrauen, wenn manikinbasierte Kurse nicht verfügbar oder kostenbedingt nicht zugänglich sind. Die Anforderungen an formelle Zertifizierungen bleiben davon unberührt.

Schlüsselwörter: Kardiopulmonale Reanimation; Herzdruckmassage; CPR-Training; DIY-Manikin; selbsthergestellt; kommerzielles Manikin; instruktorgeleitetes Training

What is a Critically Appraised Topic (CAT)?
A *Critically Appraised Topic (CAT)* is a brief, structured summary of the best available evidence on a focused first aid or resuscitation question. CATs help bridge research and practice while supporting students and emerging scholars to develop research appraisal skills. Each CAT published in the *International Journal of First Aid Education* undergoes peer review, contributing to the Journal's mission to expand accessible, international scholarship in first aid education.

CLINICAL SCENARIO

Sudden cardiac arrest (SCA) accounts for a large share of cardiovascular-related mortality worldwide (Srivats et al., 2025). The global incidence of out-of-hospital cardiac arrests (OHCA) is estimated to be around 55 cases per 100,000 person-years (Yan et al., 2020). There are approximately 60,000 OHCA cases annually in Canada, with estimated survival as low as 10% (Canadian Heart and Stroke, 2024). In the United States, the numbers on OHCA cases are higher at an estimated 350,000 annually, but the survival rates are similar at around 10% (Tsao et al., 2023).

Bystander-initiated cardiopulmonary resuscitation (CPR) is a critical, immediate intervention that significantly improves survival in cases of sudden cardiac arrest. For example, one recent large observational study found a clear graded inverse relationship between time to bystander CPR and survival, even a delay of a few minutes markedly reduces the chances of discharge (Nguyen et al., 2024). Evidence also shows that each minute without CPR and defibrillation corresponds to an approximate 7–10% reduction in survival (Vahedian-Azimi et al., 2024). Data also indicate that bystander-provided CPR has improved neurological outcomes compared to those who do not receive it (Singer & Mosesso, 2020). These statistics highlight the importance of widespread and accessible CPR training to improve meaningful survival outcomes, including limits to neurological deficits and reduced length of stay in the hospital.

High-quality CPR training is essential for equipping laypersons with the knowledge, confidence, and skills to respond effectively during emergencies. According to the American Heart Association (AHA), effective CPR involves maintaining proper compression depth, rate, full chest recoil, and correct hand placement (Meaney et al., 2013). CPR courses offered through AHA are 3 hours in length and combine instructional videos with hands-on practice with manikins guided by an instructor (American Heart Association, 2025). However, the cost and limited availability of these courses can restrict access to training, especially in low-resource or rural settings (Sasson et al., 2013).

Recent studies have looked at the use of inexpensive CPR feedback devices paired with instructional videos to teach hands-only CPR. These include models built from pillows (Goldstein et al., 2018; Nehra et al., 2024), toilet paper rolls, towels, and t-shirts (Wanner et al., 2016), and mason jar lids (Ohle et al., 2021a; Ohle et al., 2021b), designed to mimic the feedback mechanisms of commercial manikins. Studies have shown that when used with structured instructional videos, low-cost compression models created with limited resources can effectively teach key CPR skills and produce outcomes comparable to traditional manikin-based training.

Highquality CPR training remains concentrated in formal, feebased courses that require commercial manikins and certified instructors, which limits access for adolescents, community members, and lowresource settings (Sasson et al., 2013). At the same time, homemade CPR devices and brief videobased training have emerged in practice, but the supporting evidence is scattered across small, singlestudy reports, making it difficult for educators and students to judge whether these lowcost tools are truly comparable to standard manikinbased training. Therefore, the purpose of this critical appraisal topic is to examine the existing literature to determine the effectiveness of homemade CPR devices compared to in-person instruction on commercially produced manikins, as a scalable and affordable solution for CPR skill acquisition (Goldstein et al., 2018; Nehra et al., 2024; Wanner et al., 2016; Ohle et al., 2021a; Ohle et al., 2021b) and provider confidence. Expanding the reach of such tools has the potential to significantly increase the number of trained bystanders and improve global cardiac arrest survival rates.

FOCUSED CLINICAL QUESTION

Among adults and adolescents (P), is training with a homemade CPR device plus instructional video (I), compared with a standard course using a commercial manikin (C), effective in improving compression-only CPR performance (i.e., depth, rate, recoil, hand placement) and self-reported confidence (O)?

SEARCH STRATEGY

The literature search was conducted in two phases (April 2024 and March 2025) using a structured PICO framework. The database search used combinations of keywords related to homemade and low-cost cardiopulmonary resuscitation training devices, including the terms “homemade CPR device,” “DIY CPR trainer,” and “low-cost CPR manikin.” Additional search terms focused on the training modality and CPR technique, such as “compression-only CPR” and “hands-only CPR,” as well as delivery formats including “online CPR training” and “video-based CPR training.” To ensure appropriate comparison, terms related to standard training methods

were also included, such as "commercial CPR manikin" and "standard CPR training." Boolean operators (AND/OR) were applied to combine concepts and refine search results across databases. The following databases were systematically searched: CINAHL, PubMed, MEDLINE, Cochrane Library, ScienceDirect, and ProQuest.

INCLUSION AND EXCLUSION CRITERIA

Articles were included in the appraisal if they met the following criteria:

- Peer-reviewed, cross-sectional, or randomized controlled trial;
- Compared homemade CPR devices and instructional videos with a control group (e.g., Heart and Stroke CPR class or equivalent);
- Participants were between the ages of 12 and 65;
- Included CPR performance outcomes (e.g., compression depth and rate) and self-reported confidence in ability;
- The study was published in the last 10 years (2015–2025).

Articles were excluded from the appraisal if they met the following criteria:

- They did not compare homemade CPR devices with standard manikin-based training, or the homemade CPR device did not have an accompanying instructional video.
- The study focused solely on theoretical CPR education without hands-on practice.
- It was from an unpublished thesis project or abstracts lacking sufficient data.

RESULTS OF SEARCH

An initial database search in April 2024 and the subsequent search in March 2025 identified a total of 315 records. The results can be seen in Figure 1. After removal of duplicates, titles and abstracts were screened, and 13 studies were retrieved for full text screening. Of these, five met the inclusion criteria: four level 2 randomized crossover studies and one parallel design (within-subjects) study (Wanner et al., 2016). The flow of records through identification, screening, eligibility assessment, and inclusion is shown in Figure 1, and a summary of the five included studies is presented in Table 1.

SUMMARY OF SEARCH AND KEY FINDINGS

A synopsis of the level of evidence and key findings from relevant articles on homemade CPR training devices using an instructional video was generated. The Oxford Centre for Evidence-Based Medicine (OCEBM) Levels of Evidence classify research quality from Level 1 (systematic reviews of randomized controlled trials) to Level 5 (expert opinion), based on study design and methodological techniques used (University of Oxford, 2024). Within this framework, level 2 evidence is derived from well-designed randomized controlled or crossover trials and is considered strong primary evidence for evaluating intervention effectiveness (University of Oxford, 2024). The articles used in this study representing high-quality research that falls just below systematic reviews in the evidence hierarchy. The literature search was limited to studies of Level 2 evidence or higher, following the Oxford Centre for Evidence-Based Medicine (OCEBM) Levels of Evidence (University of Oxford, 2024). Five randomized crossover studies met the inclusion criteria (Goldstein et al., 2018; Nehra et al., 2024; Wanner et al., 2016; Ohle et al., 2021a; Ohle et al., 2021b). All studies compared homemade CPR devices (CPR pillow and toilet paper roll models) with standard manikin-based training (Goldstein et al., 2018; Nehra et al., 2024; Wanner et al., 2016; Ohle et al., 2021a, 2021b).

Three studies specifically evaluated the effectiveness of homemade devices during online CPR training with an instructional video (Goldstein et al., 2018; Nehra et al., 2024; Wanner et al., 2016). The studies concluded that participants trained with homemade CPR devices were able to demonstrate high-quality CPR skills, including appropriate compression depth (Goldstein et al., 2018; Nehra et al., 2024; Wanner et al., 2016; Ohle et al., 2021b), rate (within recommended guidelines) (Goldstein et al., 2018; Nehra et al., 2024; Wanner et al., 2016; Ohle et al., 2021b), hand placement (Goldstein

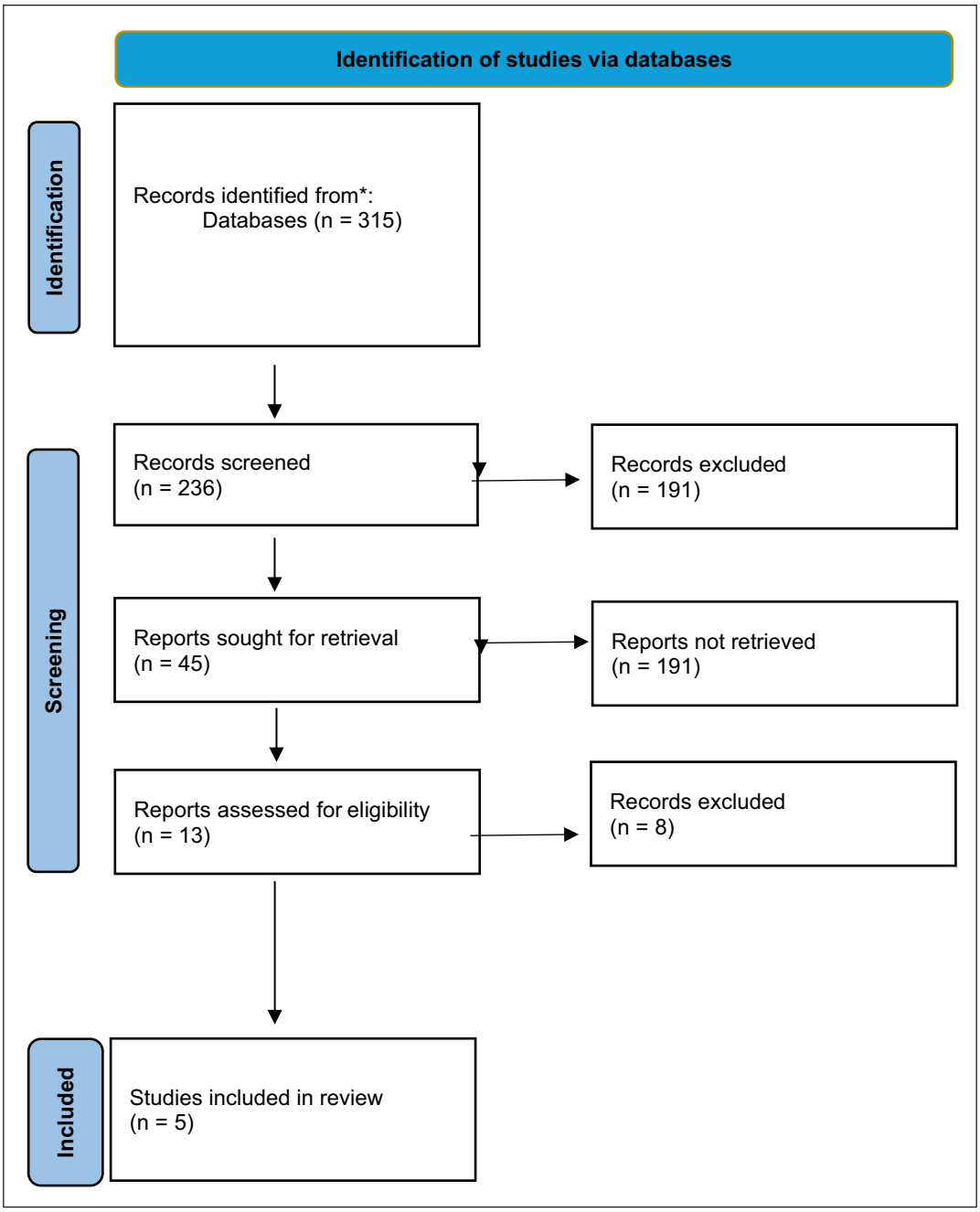

Figure 1 PRISMA Diagram.

et al., 2018; Wanner et al., 2016; Ohle et al., 2021b), and chest recoil at levels comparable to those trained with standard manikins. Nehra et al. (2024) reported that the homemade CPR pillow group achieved better chest recoil (86%) compared to the manikin group (73%) ($P < 0.001$) (Goldstein et al., 2018). Factors include the CPR pillow's combination of a soft pillow, and a plastic bottle provided different tactile feedback, which likely encouraged participants to fully release pressure between compressions, resulting in improved recoil (Goldstein et al., 2018). The touch and feel of these homemade devices varies from some commercial manikins that rely on visual or electronic feedback, allowing users to have a physical response, which may reinforce kinesthetic learning, particularly in novice learners performing compression-only CPR.

Author(s)	Study Q	Sample	Design	Intervention	Outcome Measures	Results	Level of Evidence
Ohle, R., Moskalyk, M., Boissonneault, E., Bilgasem, A., Tissot, E., & McIsaac, S. (2021).	Is learning CPR on a homemade toilet paper trainer non-inferior to a commercially available manikin?	125 lay participants (adolescents and adults, all over the age of 12) attending a science museum in Canada. The study did not further specify age or gender distribution.	Non-inferiority randomized control trial.	Both groups received 10 minutes of one-on-one instruction, including a CPR demonstration and hands-on practice focused on depth, rate, and recoil. Training ended with feedback from either a commercial or homemade trainer, plus verbal feedback from instructors.	Mean overall CPR score as determined by validated high-fidelity mannequin software, which is recognized as a reliable tool for assessing CPR performance in research settings.	Both groups achieved high overall CPR performance, as measured by high-fidelity mannequin software. The commercial mannequin group had a mean CPR score of 84%, while the homemade trainer group had a mean score of 82%. Both scores were considered above the threshold for high-quality CPR in the study.	2
Nehra, A., Ravindra, P., Bhat, R., Nagesh, S. K., Alok, Y., Nisarg S., Shanmukhappa Maddani, S., & Balakrishnan, J. M. (2024).	Comparison between a low-cost model (CPR Pillow) and a mannequin in training hands only cardiopulmonary resuscitation (CPR): A randomised trial.	206 undergraduate students	Randomized controlled trial	Participants were randomized to receive hands-only CPR training using either a low-cost homemade CPR pillow or a standard commercial mannequin. Both groups received the same instruction and hands-on practice in compression-only CPR, with performance evaluated after training.	Objective outcome measures included correct hand positioning, chest compression rate, compression depth, compression fraction, chest recoil, and overall CPR performance score, as measured by high-fidelity mannequin software.	There was no statistical difference in hand positioning, chest compression rate and fraction, depth and overall CPR score between the two groups trained via mannequin and CPR Pillow ($P > 0.05$). The CPR pillow group had better percentage of chest recoil as compared to the mannequin group (86% vs 73%; $P < 0.001$).	2
Ohle, R., Moskalyk, M., Boissonneault, E., Simmons, K., & McIsaac, S. (2021).	A homemade CPR trainer can enable real time practice during online hands-only CPR training	87 participants	Simulation-based evaluation (laboratory study) using a homemade CPR trainer to assess CPR performance metrics.	CPR was performed on a homemade trainer constructed from two stacked toilet rolls and a mason jar lid. Performance metrics were recorded using a Zoll X series defibrillator with CPR analysis during simulated compressions.	CPR quality metrics, including compression depth, full chest recoil, and compression rate, as measured by CPR analysis software.	The homemade toilet roll trainer allowed for appropriate compression depth (2" displacement) and full chest recoil. Performance metrics met American Heart Association (AHA) 2015 guidelines for high-quality CPR.	3
Wanner, G. K., Osborne, A., & Greene, C. H. (2016).	Brief compression-only cardiopulmonary resuscitation	24 participants, 12 trained and 12 untrained.	Parallel design study, with pre- and post-test.	All participants watched a 6-minute instructional video on compression-only CPR, including a	Primary outcomes included compression rate, compression depth, correct hand	Both untrained and previously trained participants demonstrated statistically significant improvements in several CPR	2

(Contd.)

Author(s)	Study Q	Sample	Design	Intervention	Outcome Measures	Results	Level of Evidence
	training video and simulation with homemade mannequin improves CPR skills.			demonstration and instructions for making a homemade CPR trainer. Participants then practiced chest compressions using a homemade trainer assembled from household items (towel, toilet paper roll, and t-shirt) as they followed along with the video.	position, correct release (recoil), and total hands-off time during a 1-minute testing period. Secondary outcomes included participants' willingness to perform compressions and inter-rater reliability between CPR experts and mannequin sensors.	skills after training with the homemade mannequin and instructional video. In the untrained group, post-training performance showed significant increases in correct compression rate, correct hand position, correct compression release (recoil), and reductions in hands-off time during testing (all $p < 0.05$). The trained group also improved significantly in correct release, hands-off time, and time to first compression following the intervention. All improvements were assessed by both CPR experts and sensor-equipped manikins, with strong inter-rater reliability. Participants reported increased confidence and willingness to perform CPR after completing the training.	
Goldstein, M., Goldstein, B., Novograd, J., Carden, K., & Kirwan, M. (2018).	Is a bed pillow as effective as a manikin torso in training college students in compression-only CPR?	242 undergraduate students: College students with no prior CPR training were randomized to one of two training rooms, one with a bed pillow (n = 119) and one with a manikin torso (n = 123)	Randomized comparative trial	Participants were randomized to a training room using either a pillow or a manikin. Each watched a 2-min video and practiced compressions using a "practice-while-watching" technique. CPR instructors were present to provide clarification. Skills were evaluated using a blinded assessor and a recording manikin.	Compression rate (cpm) and compression depth (mm), measured on a recording manikin	No significant difference in compression depth ($p = 0.89$). Mean rate was slightly higher in the manikin group (122.9 vs. 118.0 cpm; $p = 0.028$), but exceeded recommended range. No difference in overall CPR competency based on rate and depth ($p = 0.81$).	2

Table 1 Summary of Included Studies.

Wanner et al. (2016) found that participants using a homemade toilet roll trainer demonstrated comparable compression depth and rate to those trained with standard manikins, though depth consistency remained a challenge. They emphasized that combining homemade devices with instructional videos significantly improved CPR skills among previously untrained participants, including average compression rate per minute (64.3 to 103.9, $p = 0.006$ in pre- and post training respectively) (p. 4), correct hand placement compressions in one minute (8.3 to 54.3, $p = 0.002$, in pre- and post training respectively), and reduced hands-off time (41.8, 15.3 in pre- and post training respectively (p. 4). All studies highlighted the cost-effectiveness and/or accessibility of homemade CPR devices, suggesting their potential for widespread community training programs where traditional manikin training is inaccessible due to limited financial and human resources or accessibility. Ages ranged from adolescents (12 years and older) to adults, and gender representation was generally balanced or not significantly different (Wanner et al., 2016; Ohle et al., 2021b). The studies (Goldstein et al., 2018; Nehra et al., 2024; Wanner et al., 2016; Ohle et al., 2021a; Ohle et al., 2021b) sought to increase the accessibility of CPR education, focusing on resource-limited settings or groups who may face barriers to traditional manikin-based training. Interventions were specifically designed to be low-cost, reproducible, and feasible for home or virtual training, supporting equity in CPR education by addressing financial, geographic, and social barriers. While detailed reporting on race, ethnicity, and other PROGRESS-Plus factors (e.g., occupation, social capital) was limited, the body of evidence prioritizes inclusivity, noting the inclusion of underrepresented populations and aiming to reduce disparities in access to CPR training.

CLINICAL BOTTOM LINE

Results from the studies are consistent in that a low-cost compression-only CPR training device made from items found in the home and instructional videos is as effective at teaching compression-only CPR as attending an AHA-compliant CPR course.

STRENGTH OF RECOMMENDATION

Level 2 (University of Oxford, 2024) evidence exists that homemade CPR devices, when paired with structured instructional videos, can enable participants to achieve comparable compression-only CPR skill performance and self-confidence to that obtained through standard manikin-based training. However, the use of homemade devices is not currently sufficient for formal CPR certification, which requires assessment with a standardized manikin and instructor.

LIMITATIONS

The included studies generally involved small sample sizes and assessed CPR performance immediately following training, limiting evaluation of long-term skill retention. Demographic reporting across studies was limited, restricting analysis of socioeconomic, racial, and geographic diversity among participants. Additionally, variations in performance measurement tools and reliance on short-term outcomes may introduce measurement bias. These limitations highlight the need for larger, longitudinal studies evaluating real-world skill retention and implementation outcomes.

IMPLICATIONS FOR PRACTICE, EDUCATION, AND RESEARCH

This review aimed to determine the effectiveness of homemade CPR devices with instructional videos when compared to standard manikin-based training for hands-on CPR. All included studies demonstrated that homemade CPR devices, when paired with structured instructional videos, provided comparable outcomes to standard manikin-based training in terms of CPR skill acquisition. While these tools demonstrate comparable short-term performance outcomes to standard manikin-based training, they are not substitutes for formal CPR certification pathways. Instead, these homemade devices should be viewed as scalable educational adjuncts capable of increasing bystander readiness and early intervention.

Homemade CPR devices, such as the CPR pillow and toilet roll models (Goldstein et al., 2018; Nehra et al., 2024; Wanner et al., 2016; Ohle et al., 2021a; Ohle et al., 2021b), offer a cost-effective and accessible alternative for CPR training, particularly in resource-limited or remote

settings where commercial manikins are unavailable. These devices demonstrated comparable outcomes in compression depth, rate, hand placement, and chest recoil (Goldstein et al., 2018; Nehra et al., 2024; Wanner et al., 2016; Ohle et al., 2021a; Ohle et al., 2021b). The ability to replicate effective CPR skills using these homemade devices suggests that they can be integrated into community-based CPR training programs to increase accessibility. Such integration could expand CPR education and improve survival rates from OHCA.

Incorporating homemade CPR devices into educational programs can enhance learning opportunities in schools, workplaces, and communities with limited resources. Instructional videos accompanying these devices can ensure standardized training, reducing barriers related to cost and availability. Providing clear instructional guidelines and demonstrations can improve learner confidence and willingness to perform CPR, both of which are vital for effective bystander response (Srivats et al., 2025; Yan et al., 2020; Canadian Heart and Stroke, 2024; Tsao et al., 2023).

Future studies should examine long-term skill retention and confidence levels following training with homemade devices. Evidence shows that real-time feedback during CPR training significantly improves key quality metrics, such as compression depth, rate compliance, and recoil compliance, which supports the value of integrating feedback technology into low-cost models. Evaluating homemade devices in diverse populations, including adolescents and older adults, could further support their widespread adoption. Research into combining these models with modern feedback systems is warranted to optimize outcomes. Addressing these research gaps will provide deeper insights into optimizing CPR training strategies and ensuring the broadest possible access to effective, life-saving education.

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COMPETING INTERESTS

The authors have no competing interests to declare.

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