Clinical question.

In adult cardiac arrest (prehospital [OHCA], in-hospital [IHCA]) (P), does the use of self-adhesive defibrillation pads (I) compared with paddles (C), improve outcomes (eg. successful defibrillation, ROSC, survival) (O)?

Is this question addressing an intervention/therapy, prognosis or diagnosis? : Intervention/Therapy

State if this is a proposed new topic or revision of existing worksheet: Revision of existing worksheet

Conflict of interest specific to this question

Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet? No

Search strategy (including electronic databases searched).

PubMed: (heart arrest OR defibrillation OR cardioversion OR electric countershock) AND (adhesive OR self-adhesive) = 92 hits – 3 relevant
(heart arrest OR defibrillation OR cardioversion OR electric countershock) AND (paddles) NOT (adhesive OR self-adhesive) = 63 hits – 1 additional
EMBASE: (heart AND arrest OR defibrillation OR cardioversion OR electric AND countershock) AND (adhesive OR ‘self adhesive’) = 24 hits – 2 additional
(heart AND arrest OR defibrillation OR cardioversion OR electric AND countershock) AND (paddles) NOT (adhesive OR ‘self adhesive’) = 36 hits – 0 additional
AHA Endnote database: (defibrillation OR electric countershock) AND (adhesive OR self-adhesive) = 39 hits – 0 additional

Other search was also done.
#1 “pads”
#2 paddle*
#3 #1 and #2

I did separate searches using above #1 to #3 in below databases.
In Cochrane Database of Systematic Reviews: #1: 8, #2: 0, even in #1 related article 0
In Ovid Medline: #1: 5185, #2: 1514, #3: 21
In PubMed: #1: 5259, #2: 1551, #3: 21
In Biological Abstracts: #1: 11224, #2: 1281, #3: 14
In ISI Web of Knowledge: #1 in title: 1395, #2 in title:: 930, #3: 3

The results of Ovid Medline search and PubMed include same references that contain all of other search results.

• State inclusion and exclusion criteria

inclusion: adult for human studies, cardiac arrest. Trials in any type of cardiac arrest patients in prehospital, or in-hospital were eligible. But they should be original research and relevant to the clinical question.

All trials, irrespective of blinding or language status, that compared any pad defibrillation with paddle defibrillation were included.

exclusion: infant and child for human studies, implant defibrillator, on cardiac arrest, non-comparison study without parameters or endpoints which lead to the difference between pads and paddles, e.g. To assess the effect of electrode pad size on defibrillation success)

• Number of articles/sources meeting criteria for further review:

12 studies met criteria for further review. Of these 1 was LOE 3 (historical control), two were LOE 4 (case series), and 9 were LOE 5 (not directly related).
## Summary of evidence

### Evidence Supporting Clinical Question

<table>
<thead>
<tr>
<th>Level of Evidence</th>
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<tbody>
<tr>
<td>Good</td>
<td>Stults 1987, 872, AB</td>
<td></td>
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<tr>
<td>Fair</td>
<td></td>
<td>Bradbury 2000, 203, E</td>
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<td>Poor</td>
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<td>Bojar 1988, 587, E</td>
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### Level of Evidence

- **A** = Return of spontaneous circulation
- **B** = Survival of event
- **C** = Survival to hospital discharge
- **D** = Intact neurological survival
- **E** = Other endpoint
- *Italics* = Animal studies
### Evidence Neutral to Clinical question

<table>
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<tr>
<th>Good</th>
<th>Stults 1987, 872, C</th>
<th>Perkins 2007, 109, E</th>
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<tr>
<td>Fair</td>
<td>Kerber 1985, 57, E</td>
<td>Perkins 2002, 405, E</td>
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<td>Kerber 1985, 136, E</td>
<td>Kerber 1984, 794, E</td>
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### Evidence Opposing Clinical Question

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### REVIEWER’S FINAL COMMENTS AND ASSESSMENT OF BENEFIT / RISK:

There is no new clinical study but one manikin study (Parkins 2007) was published after 2005. There is only one small supportive, good quality LOE 3 control study that compared with historical control (Stults 1987, 872, N=127) that was published in 1987. They compare self-adhesive electrode pads with standard chest monitoring leads and hand-held electrode paddles in the management of prehospital ventricular fibrillation in a single urban paramedic service. Shocks were delivered more quickly with self-adhesive pads than with hand-held paddles (1.6 vs 2.5 min; P < 0.001). Self-adhesive pads significantly improved return of spontaneous circulation and hospital admission compared with hand-held. They also reported survival to hospital discharge with self-adhesive pads is tend to better than that with hand-held paddles (13/58; 22% vs. 10/69; 14%) but that is not significant. There are also two supportive, fair and poor quality LOE5 reports (Bradbury 2000, 203, Bojar 1988, 587) that showed superiority of self-adhesive pads to paddles for monitoring return to sinus rhythm after shock. There are also several neutral, fair and poor quality LOE4 and LOE5 reports of changes of TTI using pads. To have definite conclusion for this issue randomized controlled clinical trials are needed.

### Acknowledgements:

We thank Dr. Clifton Callaway and Dr. Richard E. Kerber for their advices of search strategy and review of the literatures.
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<th>Full Citation*</th>
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*Level 5, Supportive, Poor.  
Only introduction of technique of defibrillation or cardioversion with self-adhesive external pads. |
*Level 5, Supportive, Fair (not randomized).  
Mannequin (monitor and defibrillator) study.  
When using the high-impedance testing device, the post 200 J shock monitoring rhythm through gel pads was initially displayed as ‘no signal’ (Hewlett Packard XL) or ‘asystole’ (Physio-Control LIFEPAK 9). The median time taken for the monitor display to return to sinus rhythm signal was 40 seconds (range 17-61 s) and this time also tended to increase with each successive shock. On the other hand, when using Fast-Patch electrodes (self-adhesive combination defibrillator electrodes), the original test signal always returned immediately. This is supportive but only shown on mannequin model. |
*Level 5 - different of patients (healthy volunteers), Fair - randomized but neither blinded nor controlled, Neutral  
Comparison: yes  
Setting: Lab  
Endpoints: TTI  
Comment: Study showed or suggested neither advantages nor disadvantages between interventions, pads and paddles. Study showed transthoracic impedance was related to electrode size not to procedures. This study does not demonstrate that self-adhesive pads per se are disadvantageous, and confirms that impedance is related to electrode size, irrespective of whether it is manual paddles or self-adhesive pads. |
*Level 5, Neutral, Fair (not randomized).  
Mean baseline TTI of 3M defibrillation pads (2346N) significantly rose and pad mass decreases in 30 minutes, after which TTI continued to increase in a linear fashion. This study suggests 3M defibrillation pads can safely be left on the chest wall for at least 10-30 min in a typical hospital environment before evaporative drying results in a significant increase in transthoracic impedance without shock. No comparison with paddle/paddle gel. |
*Level 5, Neutral, Fair (not randomized).  
Of the defibrillation pads exposed to air for less than 30 min, in only one of 49 pads was the loss of mass due to evaporation consistent with a significant increase in TTI. Two pads used for more than 30 min, both attained a mass consistent with a significant increase in TTI. This study suggests defibrillation pads can be used for up to 30 min without evaporation causing a clinically significant increase in TTI. No comparison with paddle/paddle gel. |
*Level 5, Neutral, Fair (not randomized).  
Low-energy shocks were far less successful in four patients whose transthoracic impedance was greater than one standard deviation above the mean (99-118 ohm). Only 27% (3/11) of the low-energy shocks were successful for defibrillation/cardioversion of various atrial and ventricular arrhythmias in the patients with high transthoracic impedance, while 77% (20/26) were successful in patients with average transthoracic impedance (P < .01). This study suggests high-energy |
Level 4, non-randomized, case series, Fair, Neutral  
Comparison: no  
Setting: OR  
Endpoints: successful defibrillation  
Comment: Concludes there is no difference in success rates for VF/VT patients between self-adhesive pads and paddles which data was from other report. |
| --- | --- |
Level 4, Neutral, Fair (case series).  
Self-adhesive electrode pads defibrillated 7/17 times (41%) with 100 joules, 22/36 times (61%) with 200 joules, 7/9 times (78%) with 400 joules. Placement of the pads, apex-anterior vs. apex-posterior, made little difference in patients, either in transthoracic impedance or in success rates. This study suggests high-energy shocks (> 200 joules) are needed for defibrillation for cardiac arrest patients.  
Comment: Concludes there is no difference in success rates between gel pads and self-adhesive pads. This study yields additional information from animal data, though it includes clinical data which appears to be the same as in Kerber 1984. |
Level 5 (animals), Neutral. Fair (not randomized). |
Level 5, prospective non-randomized, Fair, Neutral  
Comparison: yes  
Setting: lab  
Endpoints: time needed for initial ECG monitoring  
Comment: Self-adhesive pads slightly quicker than gel pads & paddles when used to monitor initial rhythm. |
Level 5 (Manikin study), Good, (Randomized Control Study), Neutral  
Comparison: yes  
Setting: lab  
Endpoints: the pre-shock pause between cessation of chest compression and shock delivery  
Comment: There was no deference regarding hands- free time between pads and paddles using either AHA or ERC techniques. |
Level 3, controlled with retrospective control, non-randomized, Good, Neutral  
Comparison: yes  
Setting: pre-hospital  
Endpoints: paddles for time to initial shock, termination of VF, conversion to an organized rhythm, survival to hospital admission, and hospital discharge  
Comment: Only A clinical study of this type. Self-adhesive pads is equal to paddles for survival to hospital discharge but superior to paddles for time to initial shock, termination of VF, conversion to an organized rhythm, survival to hospital admission and reduction in ECG artefact. Support for endpoint A & B, neutral for C. |

*Type the citation marker in the first field and then paste the full citation into the second field. You can copy the full citation from EndNote by selecting the citation, then copying the FORMATTED citation using the short cut, Ctrl-K. After you copy the citation, go back to this document and position the cursor in the field, then paste the citation into the document (use Ctrl-V). For each new citation press Tab to move down to start a new field.*