
# Hemodynamické profily těžké sepse a septického šoku u dětí

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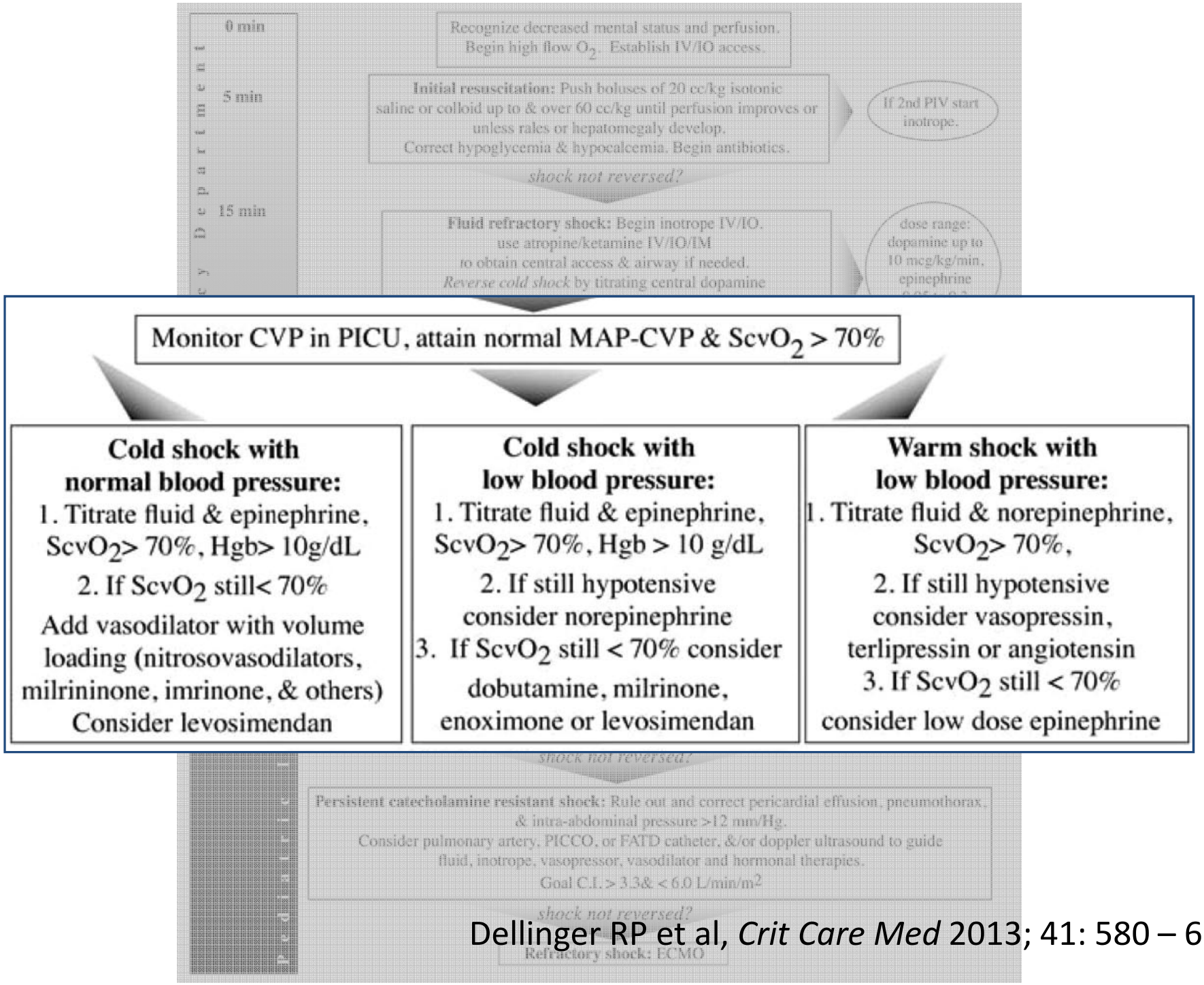


Dellinger RP et al, *Crit Care Med* 2013; 41: 580 – 637

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# Hemodynamic Support in Fluid-refractory Pediatric Septic Shock

Gary Ceneviva, J. Alan Paschall, Frank Maffei and Joseph A. Carcillo

*Pediatrics* 1998;102;e19

Ceneviva G et al, *Pediatrics* 1998; 102: e19

**Hemodynamic Support in Fluid-refractory Pediatric Septic Shock**
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Septický šok refrakterní k podání tekutin (> 60 ml/kg), PAC do 6 h od dg, 50 dětí

Pts rozděleni podle hemodynamiky a použití inotropů, vasopresorů a/nebo vasodilatátorů s cílem CI > 3.3 l/min/$m^2$ a SVRI > 800 dyn/s/$cm^5$/$m^2$

| | | | |
|---|---|---|---|
| 1. | ↓ CO ↑ SVRI | 58 % | inotropika (+ vasodilatace) |
| 2. | ↑ CO ↓ SVRI | 20 % | vasopresor |
| 3. | ↓ CO ↓ SVRI | 22 % | vasopresor + inotropika |

Ceneviva G et al, *Pediatrics* 1998; 102: e19

| | After Fluid Resuscitation | After Initial Therapy Adjustment | 48 Hours |
|---|---|---|---|
| Group I ($n$ = 29) | | | |
| CI | 3.06 ± .26 | 3.3 ± .16* | 4.0 ± .2** |
| SVRI | 1794 ± 176 | 1758 ± 158* | 1178 ± 65** |
| Group II ($n$ = 10) | | | |
| CI | 8.51 ± 1.1 | 6.3 ± .75 | 5.06 ± .41** |
| SVRI | 622 ± 184 | 919 ± 99 | 1090 ± 91** |
| Group III ($n$ = 11) | | | |
| CI | 3.93 ± .28 | 4.37 ± .26 | 5.07 ± .29** |
| SVRI | 922 ± 87 | 904 ± 65 | 1089 ± 92 |

Ceneviva G et al, *Pediatrics* 1998; 102: e19

Group I ↓ CO ↑ SVRI

After Fluid Resuscitation and Initial Therapy Adjustment

21 patients inotropes alone, 8 patients inotropes + vasodilators

After 48 hours* ($P < .05$ addition of vasodilators, Fisher's exact test)

8 patients inotropes alone, 19 patients inotropes + vasodilators, 1 patient inotrope + vasopressor, 1 patient vasopressor only

Group II ↑ CO ↓ SVRI

After Fluid Resuscitation and Initial Therapy Adjustment

10 patients vasopressor only

After 48 hours ($P < .05$ addition of inotropes, Fisher's exact test)

5 patients vasopressor only, 2 patients vasopressor + inotrope, 2 patients inotrope alone, 1 patient inotrope + vasodilator

Group III ↓ CO ↓ SVRI

After Fluid Resuscitation and Initial Therapy Adjustment

11 patients inotrope + vasopressor

After 48 hours

6 patients inotrope + vasopressor, 5 patients inotrope alone

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| | | | mortalita |
|---|---|---|---|
| 1. ↓ CO ↑ SVRI | 58 % | inotropika (+ vasodilatace) | 28 % |
| 2. ↑ CO ↓ SVRI | 20 % | vasopresor | 10 % |
| 3. ↓ CO ↓ SVRI | 22 % | vasopresor + inotropika | 9 % |

Ceneviva G et al, *Pediatrics* 1998; 102: e19

# Distinct Hemodynamic Patterns of Septic Shock at Presentation to Pediatric Intensive Care

Joe Brierley, MA[a,b], Mark J. Peters, PhD[a,b]

*Pediatrics* 2008;122;752

## What's Known on This Subject

Both warm and cold shock have been observed in pediatric septic shock. Outcomes worsen exponentially as shock persists. Guidelines recommend that therapy be tailored to individual hemodynamics, and targeting a central venous oxygen saturation of >70% may offer an advantage.

Brierley MA et al, *Pediatrics* 2008; 122: 752

# Distinct Hemodynamic Patterns of Septic Shock at Presentation to Pediatric Intensive Care

Joe Brierley, MA[a,b], Mark J. Peters, PhD[a,b]

*Pediatrics* 2008;122;752

METHODS. This was a prospective observational study of 30 children with suspected fluid-resistant septic shock (minimum: 40 mL/kg) admitted to the PICU of a tertiary care children's hospital between July 2004 and July 2005. Children were classified according to admission diagnosis (community-acquired sepsis or central venous catheter-associated infection) and assessed within 4 hours after the onset of shock with a noninvasive cardiac output device. Cardiac index and systemic vascular resistance index were measured for all patients. Central venous oxygen saturation was measured for patients with accessible central venous lines at the time of hemodynamic measurements (typically at the superior vena cava-right atrium junction).

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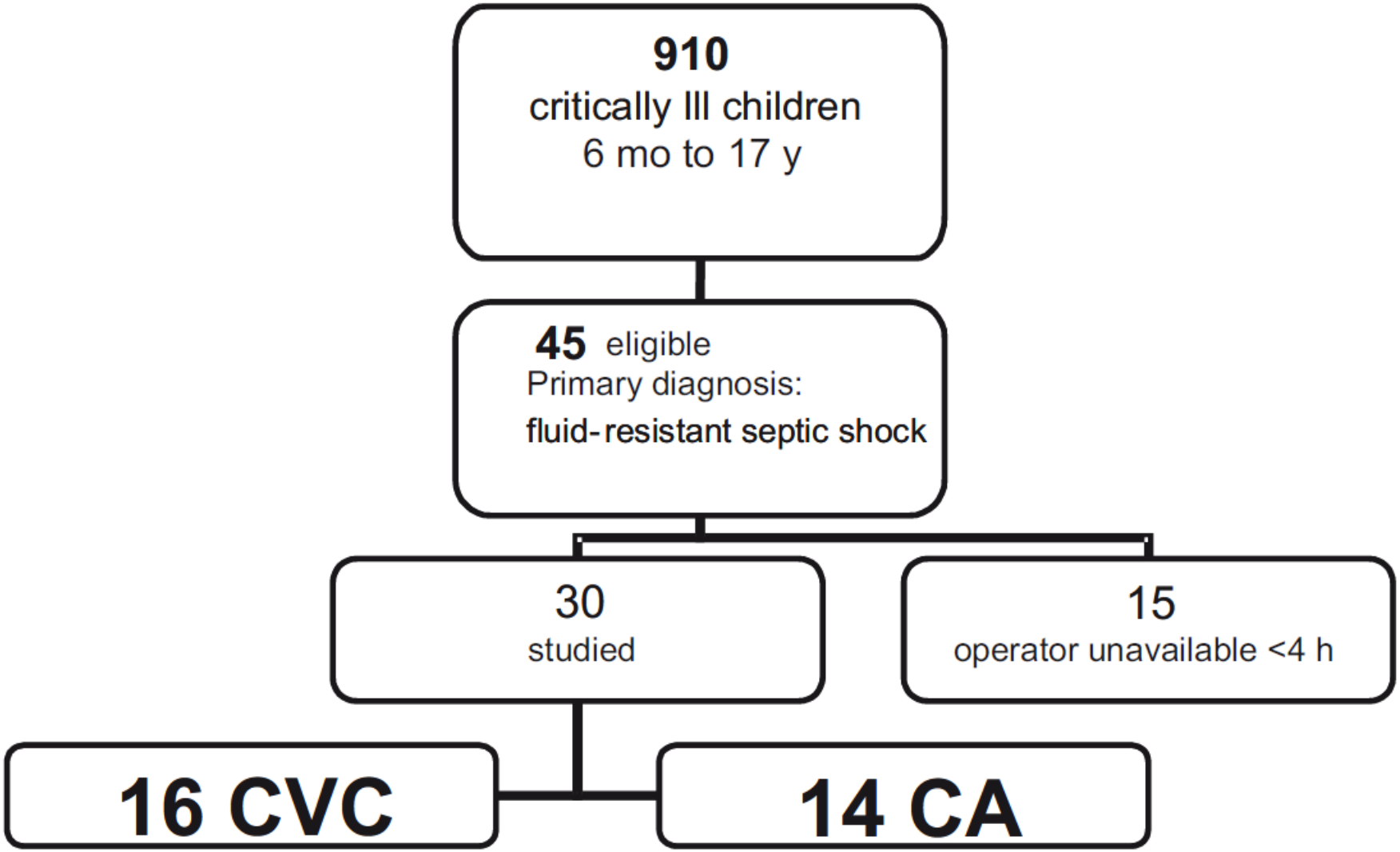


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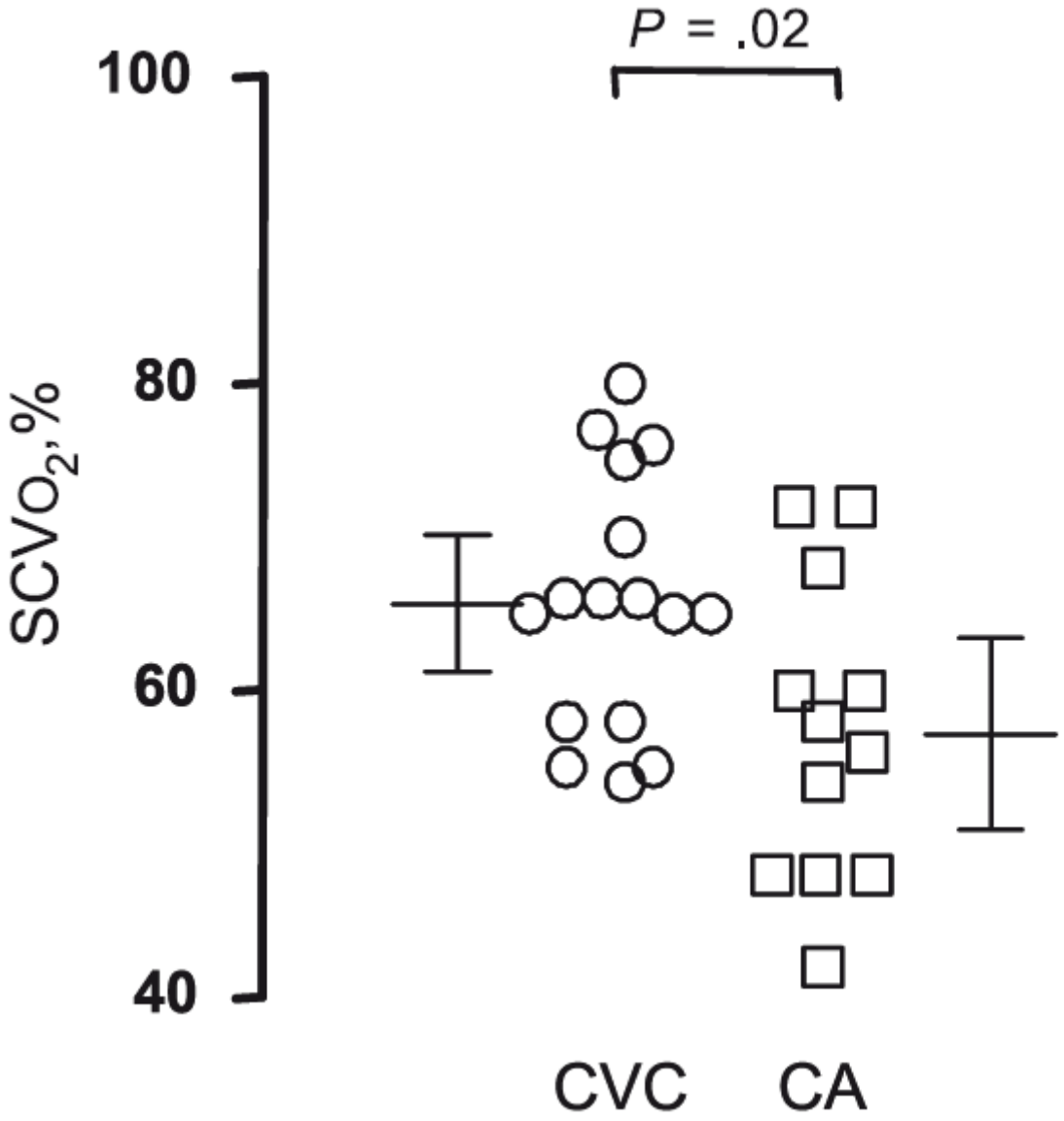


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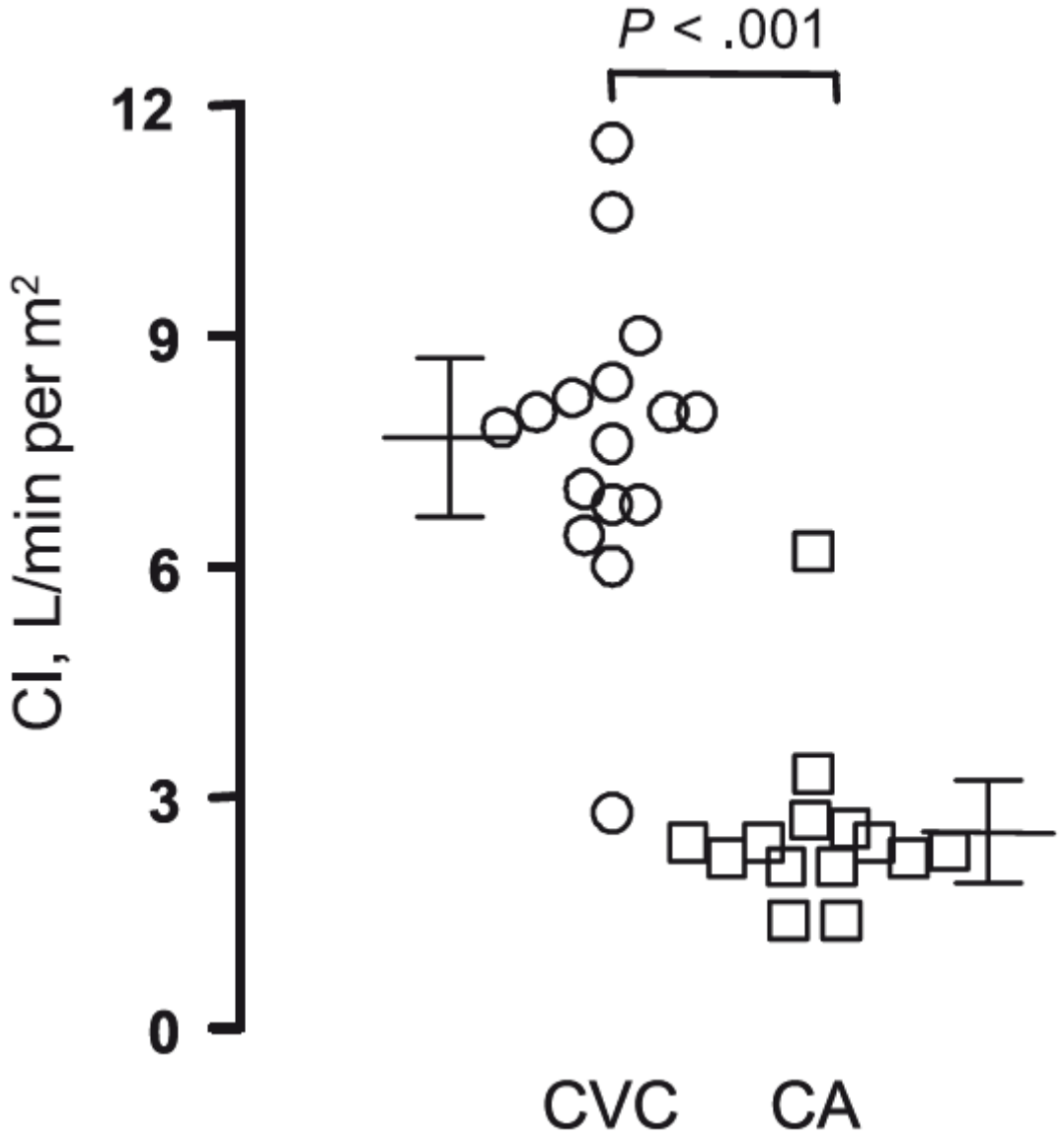


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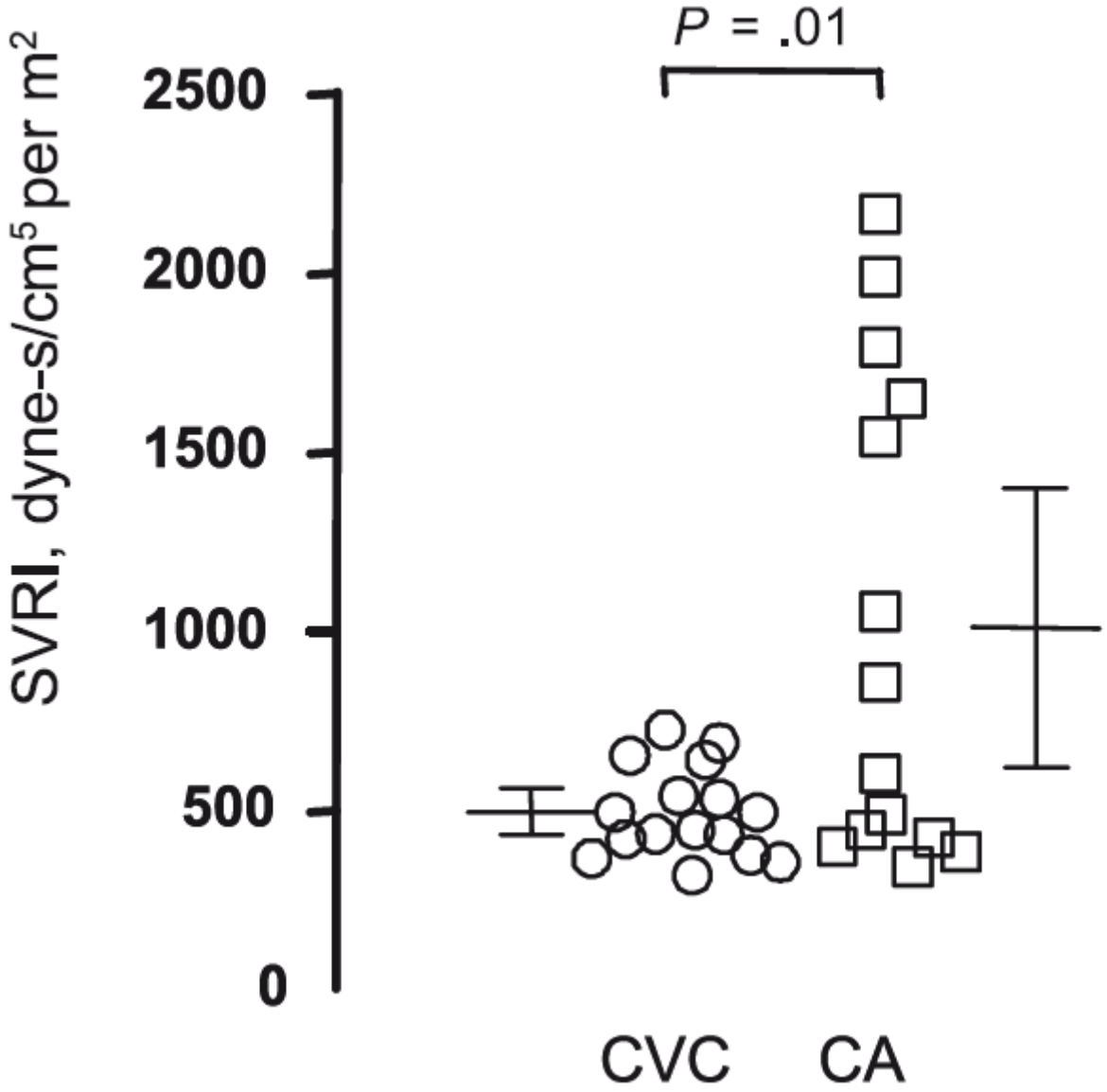


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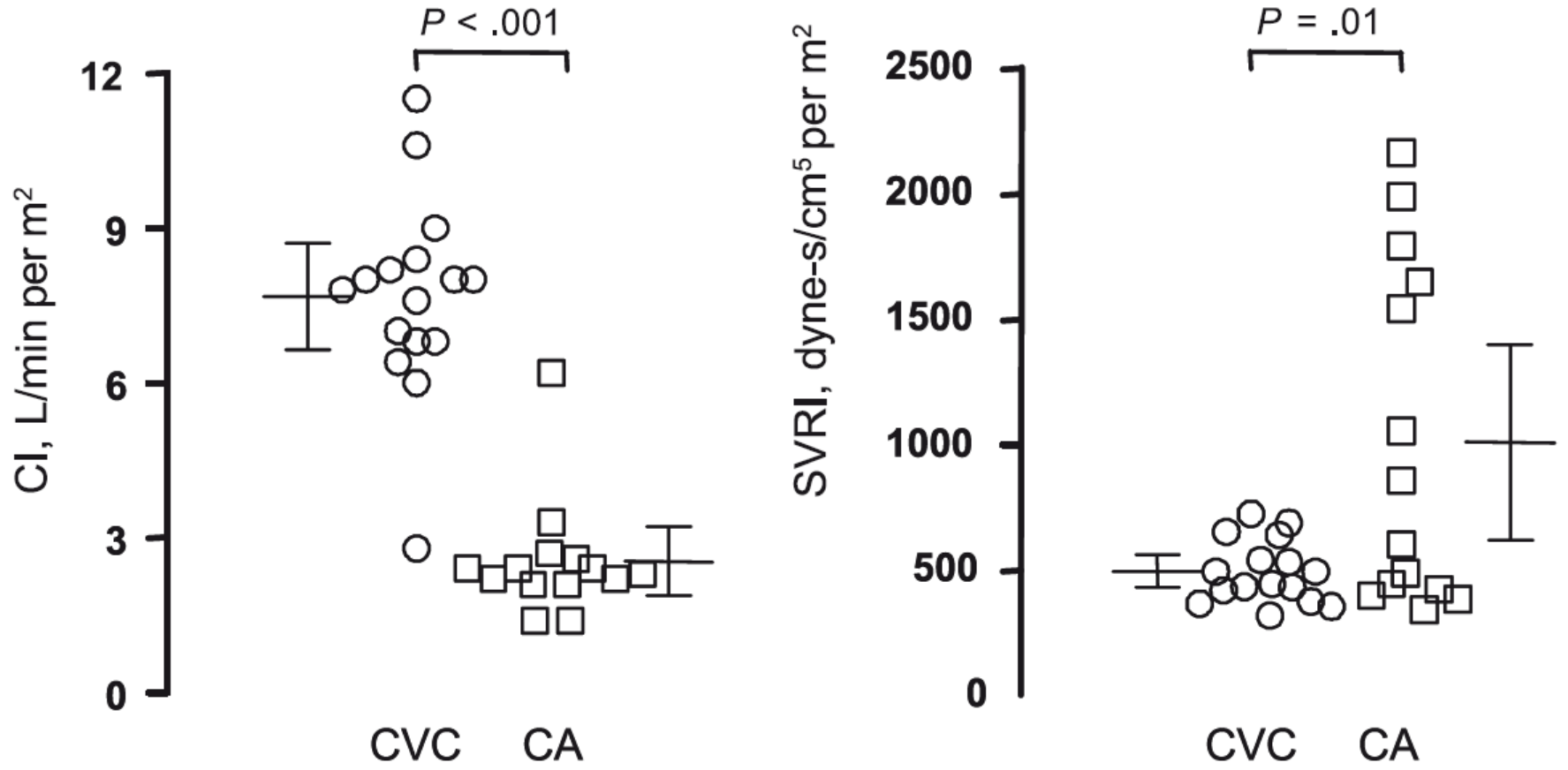


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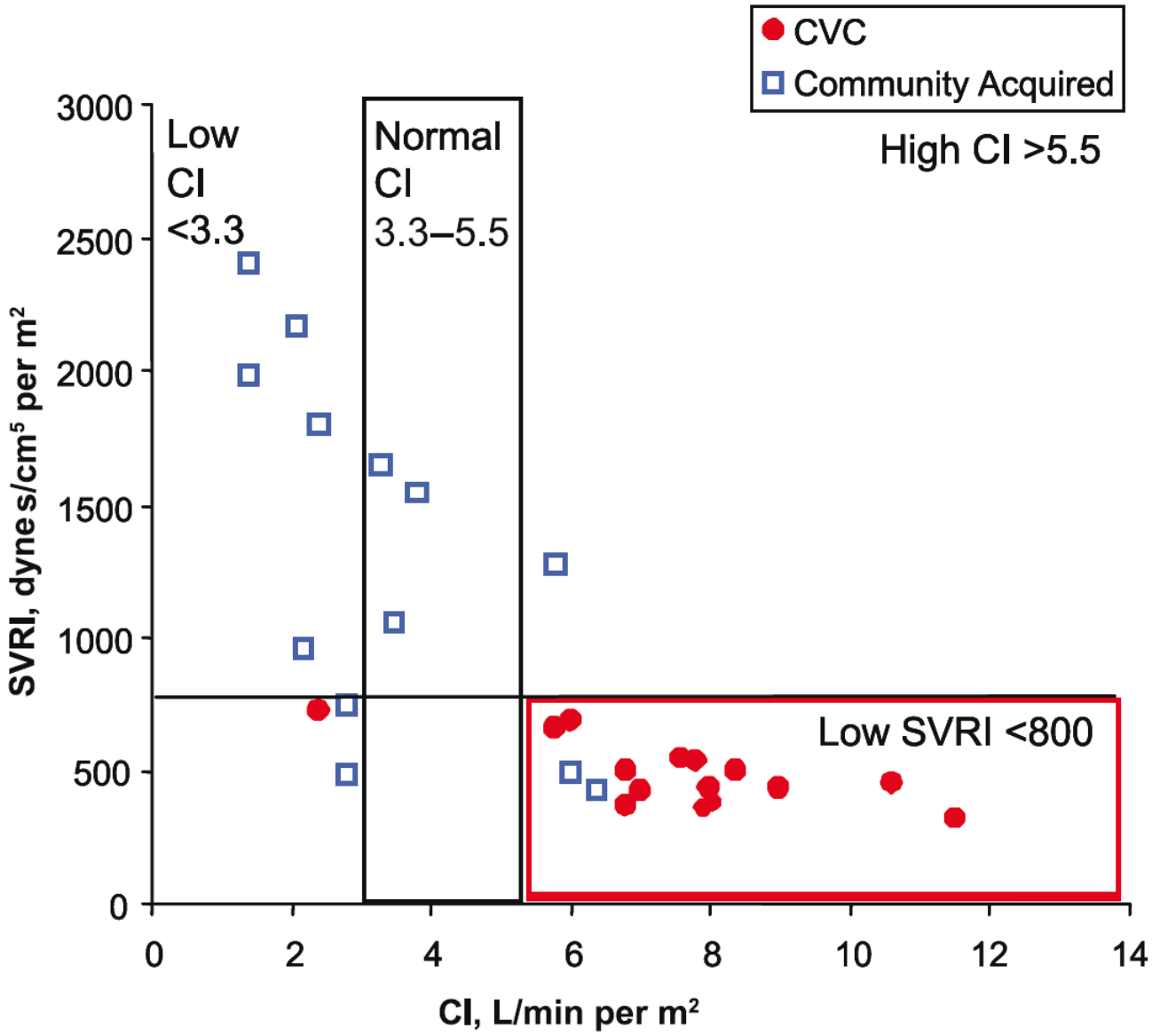


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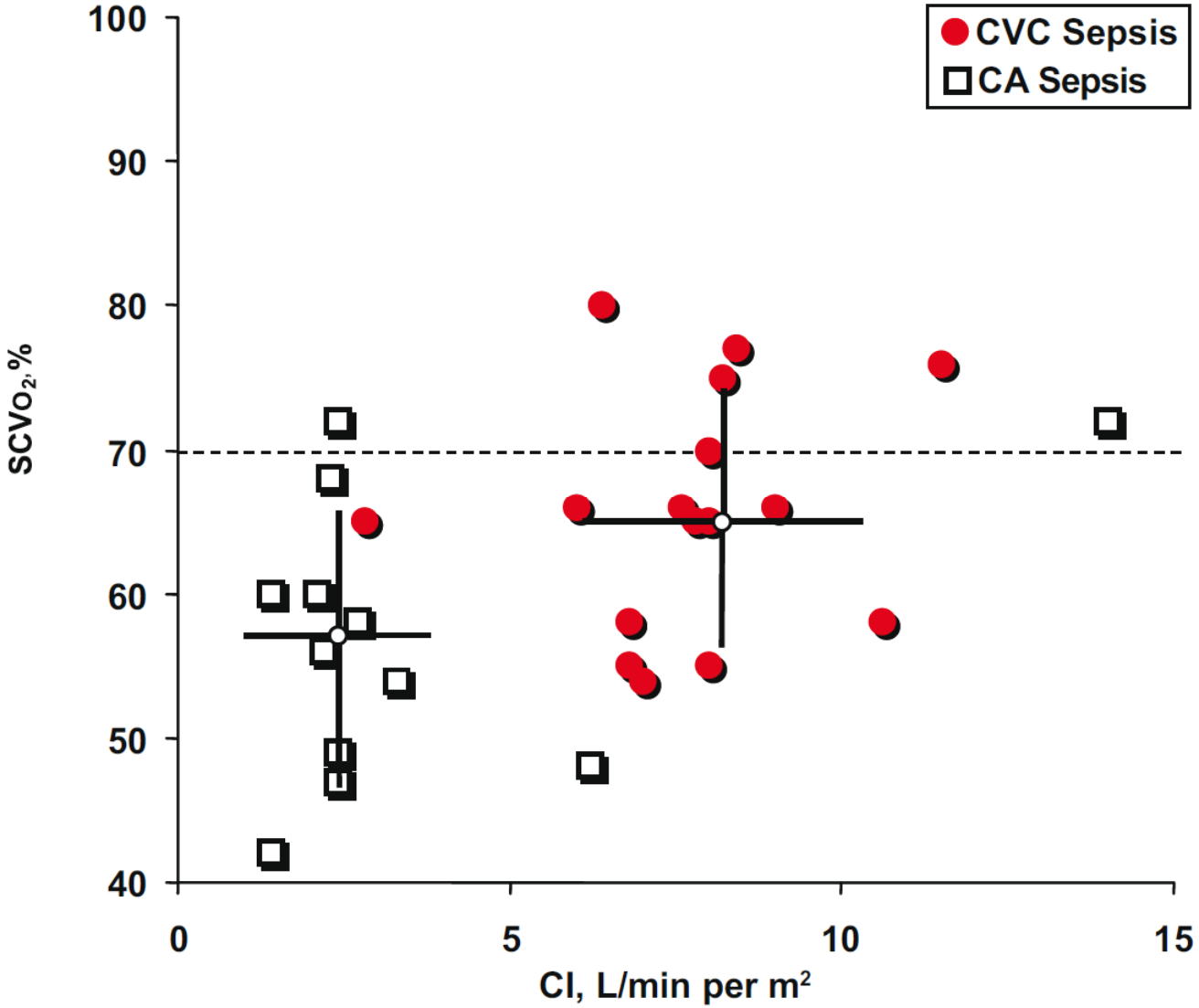


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Intensive Care Med (2013) 39:1602–1609
DOI 10.1007/s00134-013-3003-z

PEDIATRIC ORIGINAL

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# Evolution of haemodynamics and outcome of fluid-refractory septic shock in children

- prospektivní observační studie
- leden 2009 – prosinec 2011 (36 měsíců)
- 36 dětí s fluid-refractory septic shock (> 60 ml/kg)
- nemocniční infekce (18 pts) vs komunitní infekce (18 pts)
- CI, SVRI a $ScvO_2$

Deep A et al, *Intensive Care Med* 2013; 39: 1602 – 1609

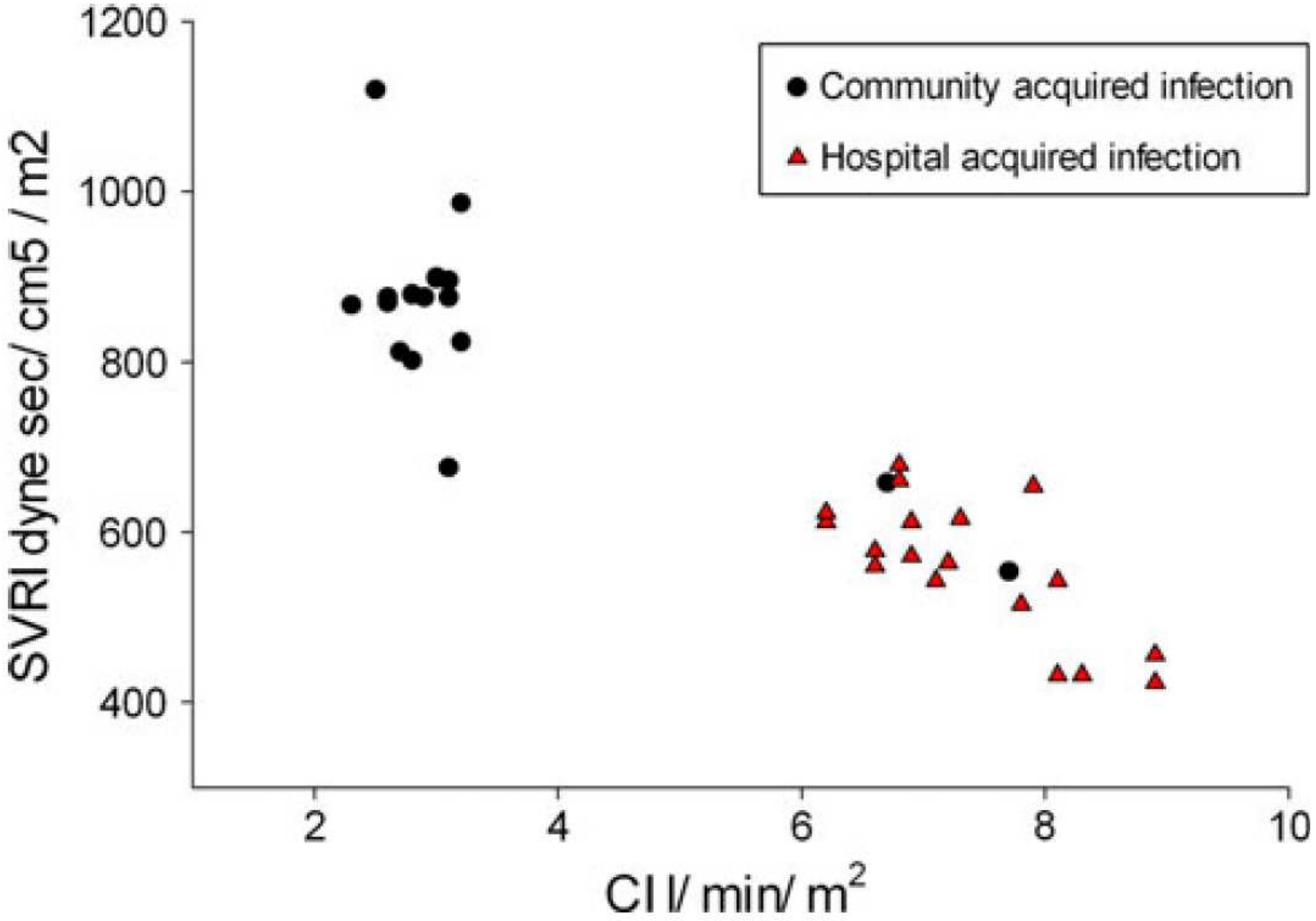
**Supplementary files:**

*A table of demographic data of septic children*

| Parameter | Hospital-acquired | Community-acquired | P value |
|---|---|---|---|
| N | 18 | 18 | NS |
| Age (yrs) | 5.92 (6.4) | 7.64 (5.3) | NS |
| Gender (Male) | 9 (50%) | 10 (55.6%) | NS |
| Body weight (Kg) | 21.98 (18.6) | 30.18 (16.9) | NS |
| Co morbidities | Liver transplant 7, leukaemia/BMT 2, congenital malformation 2, metabolic disorder 3, bowel surgery 4 | Pneumonia 3, septic arthritis 1, liver transplant 2, meningitis 2, Asthma 1, WPW syndrome 1, cerebral palsy 1, muscular dystrophy 1, bowel surgery 4 | Not compared |
| Immunity compromised (on steroids ± other) | 12 (66.7%) | 2 (11.1%) | 0.002 |
| Proportion in warm shock at presentation (SVRI < 800 dyne-sec/cm$^5$/m$^2$) | 18 (100%) | 3 (16.7%) | <0.001 |
| Proportion in cold shock at presentation (CI < 3.3 L/min/m$^2$) | 0 (0%) | 15 (83.3%) | <0.001 |
| Long-term central venous access | 12 (66.7%) | 1 (5.6%) | <0.001 |
| Mechanically ventilated | 18 (100%) | 18 (100%) | NS |
| Proportion with subsequent positive blood culture | 94.5 % (*Klebsiella* 3, *Pneumococcus* 1, *Vancomycin resistant enterococci* 1, *Staph aureus* 4, *Coag Neg Staph* 4, *Ecoli* 3, *MRSA* 1) | 94.5 % (*Klebsiella* 3, *Pneumococcus* 4, *Staph aureus* 2, *Coag Neg Staph* 1, *Strep A* 3, *Ecoli* 2, *Meningococcus* 2) | NS |
| Continuous renal replacement therapy (CRRT) required | 4 (22.2%) | 2 (11.1%) | NS |
| PIM2 score | 16.72(22.33) | 20.56(20.89) | NS |
| Duration of ICU stay (days) median (range) | 5.0 (3-47) | 4.5 (1-46) | NS |
| 28 day survival | 16 (88.8%) | 16 (88.8%) | NS |

Summary statistics are mean (SD) or count (percentage) as appropriate. Student *t* test and Wilcoxon signed-rank test were used to test differences in continuous variables where appropriate. The $\chi 2$ test and Fisher's exact test used for proportions where appropriate. NS denotes 'Not significant with P > 0.05'. Duration of ICU stay was summarised by median (range) and tested by the Wilcoxon test.

Deep A et al, *Intensive Care Med* 2013; 39: 1602 – 1609

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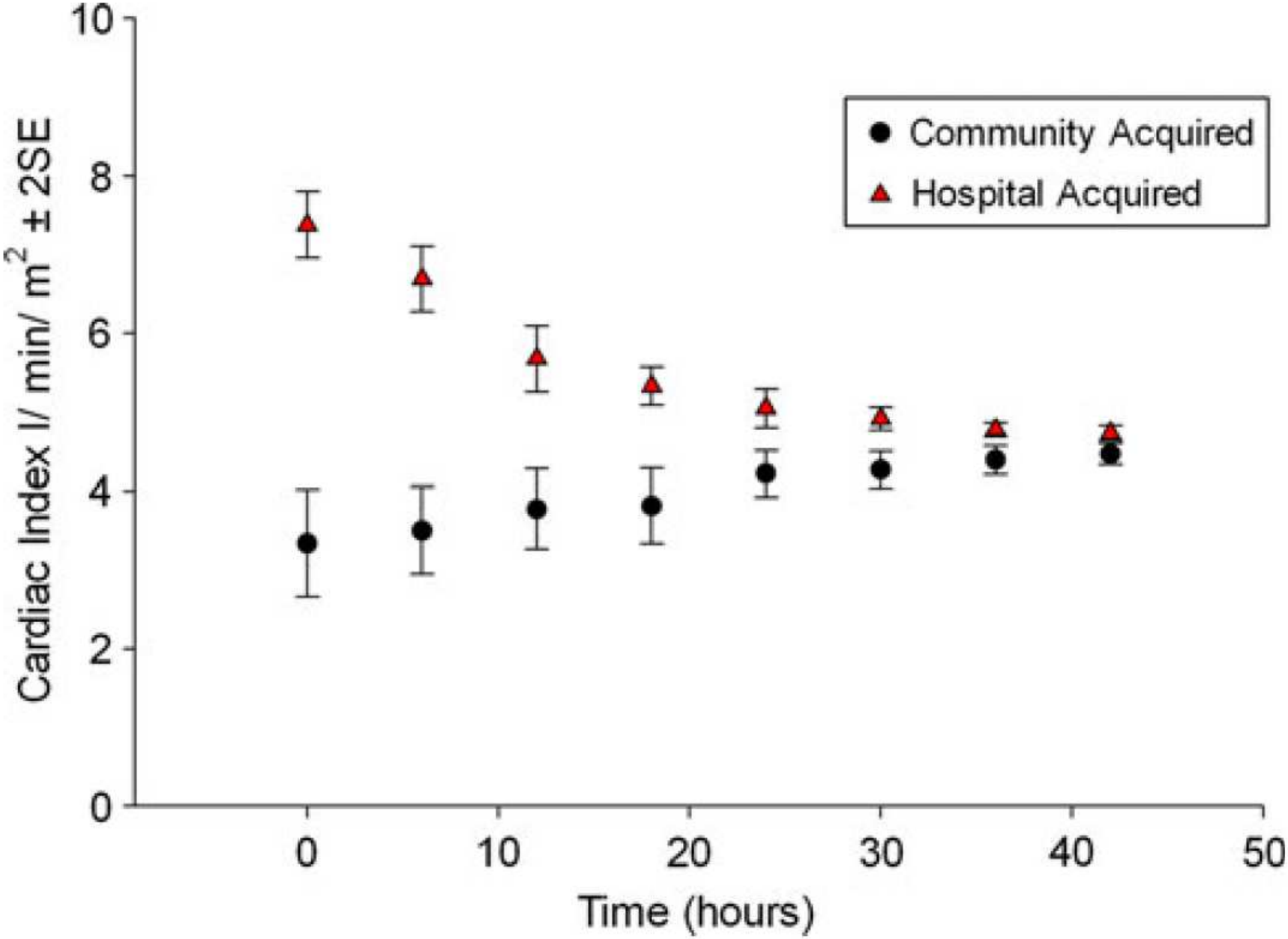


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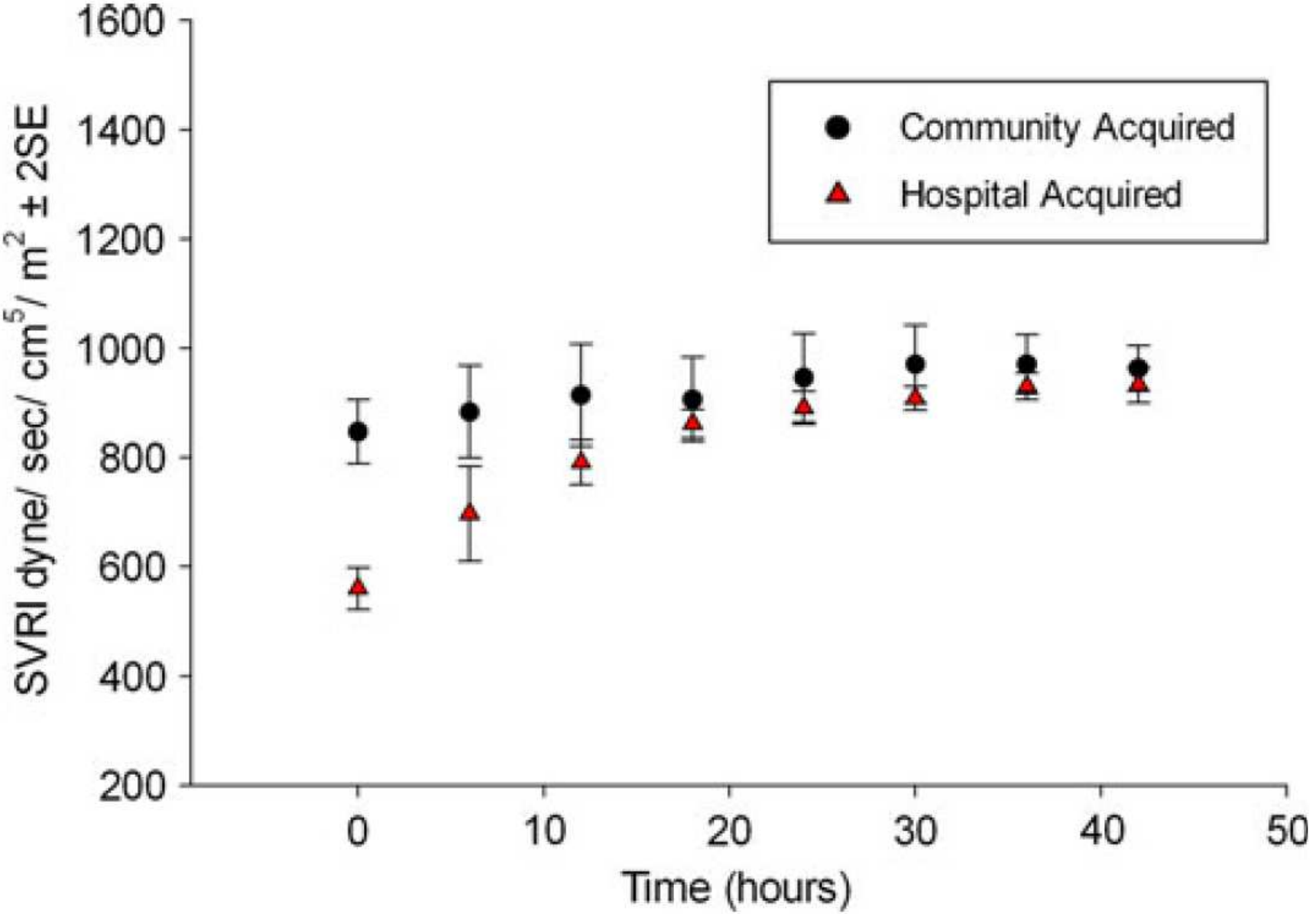


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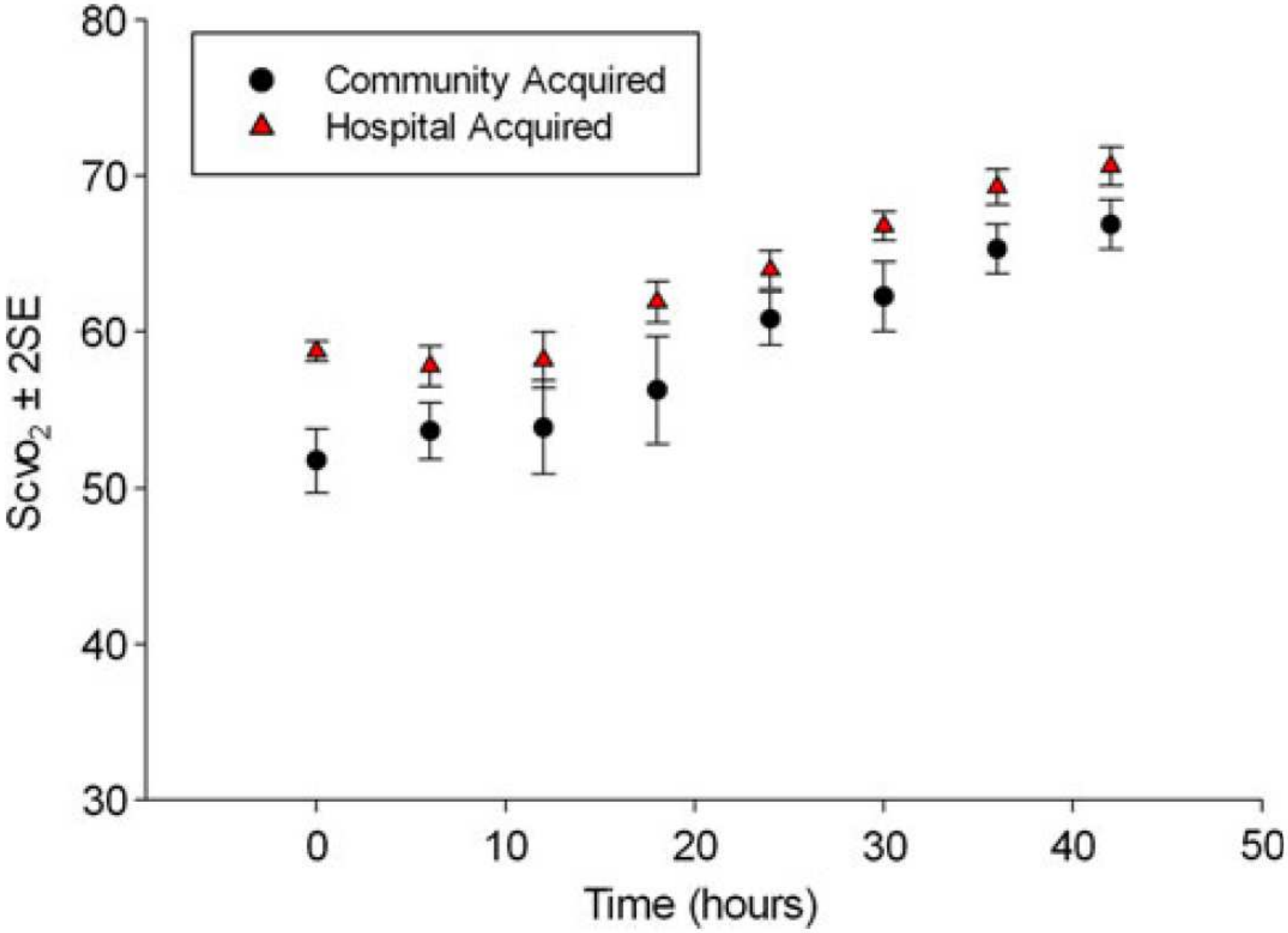


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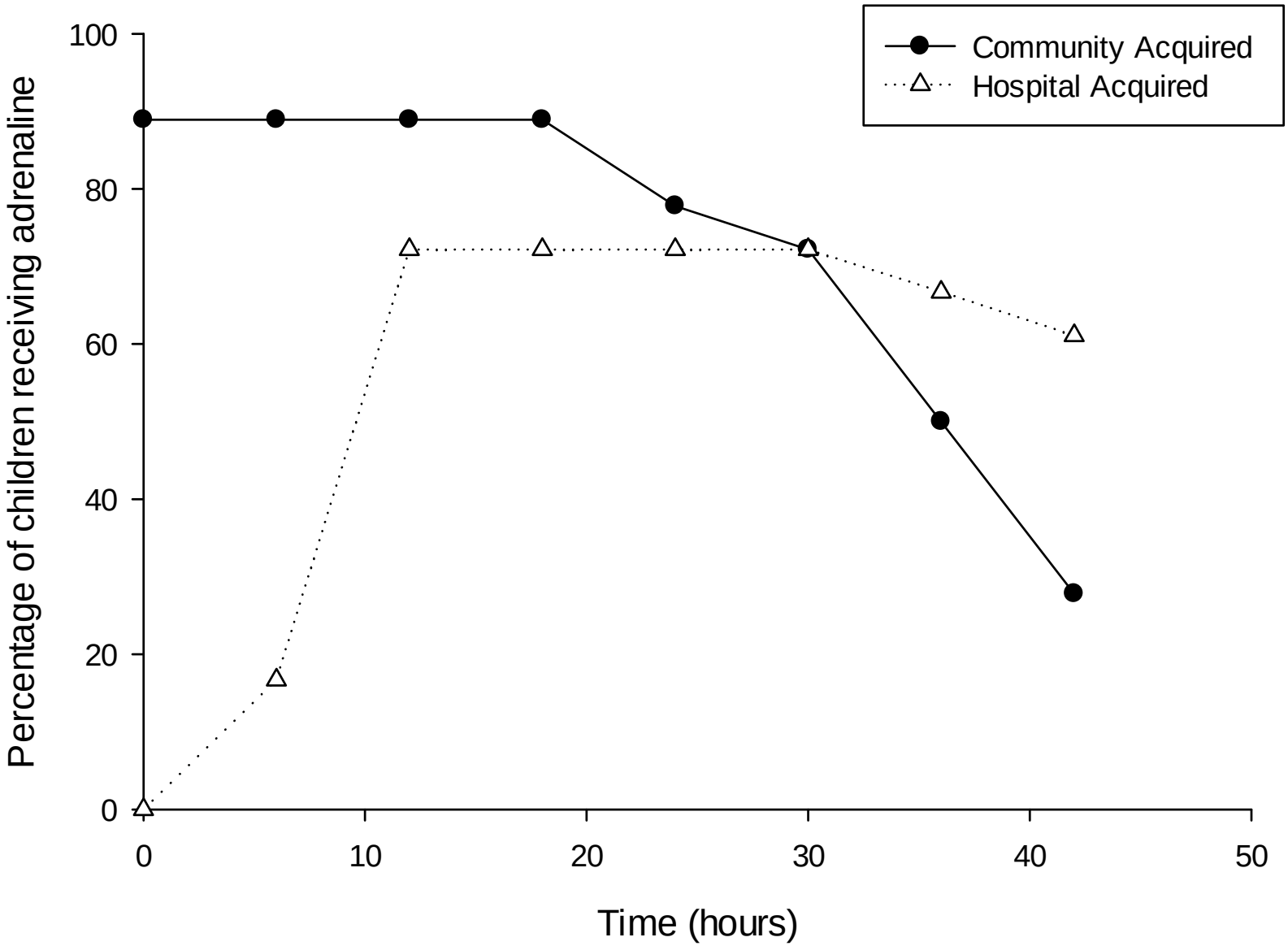


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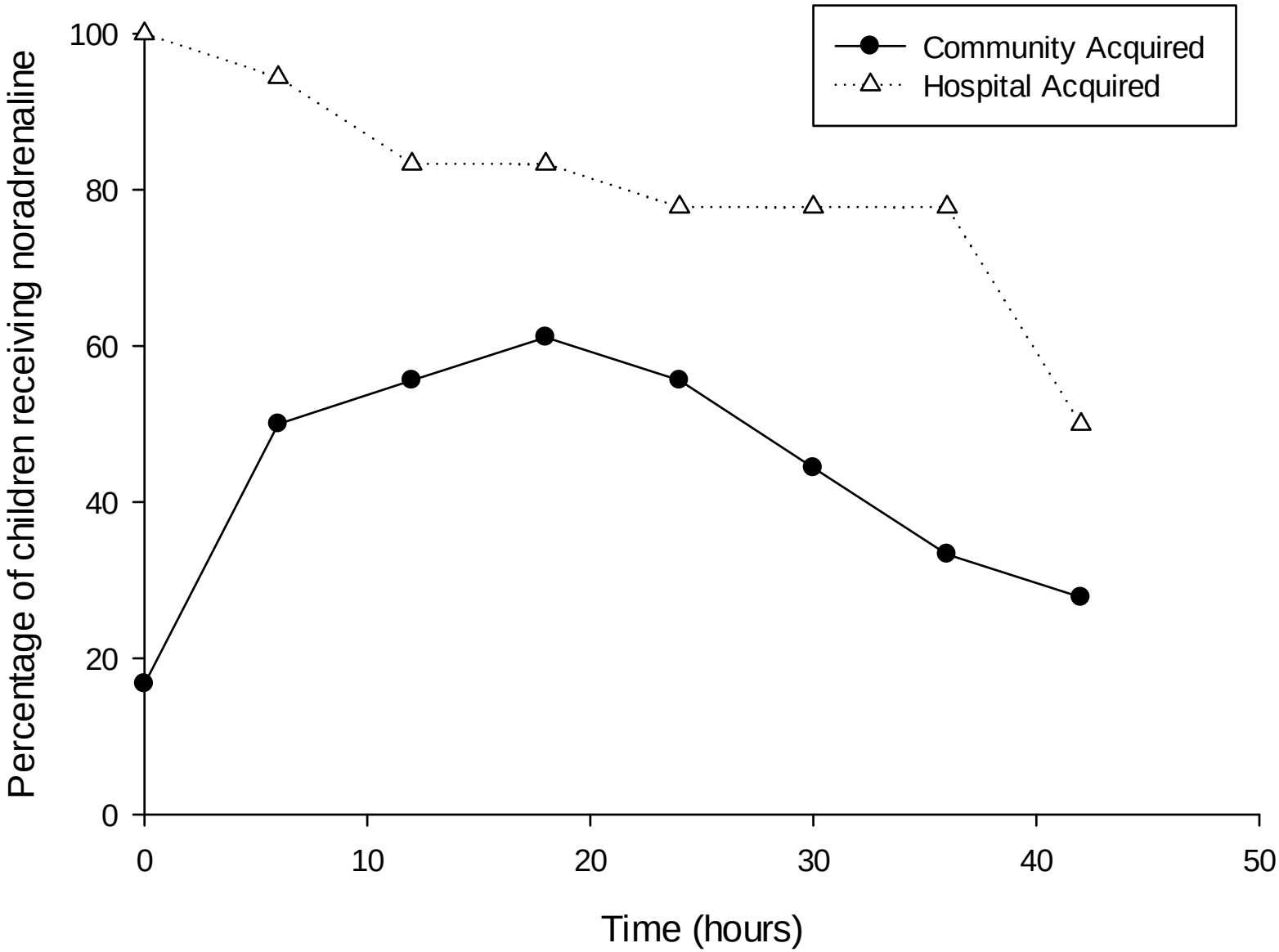


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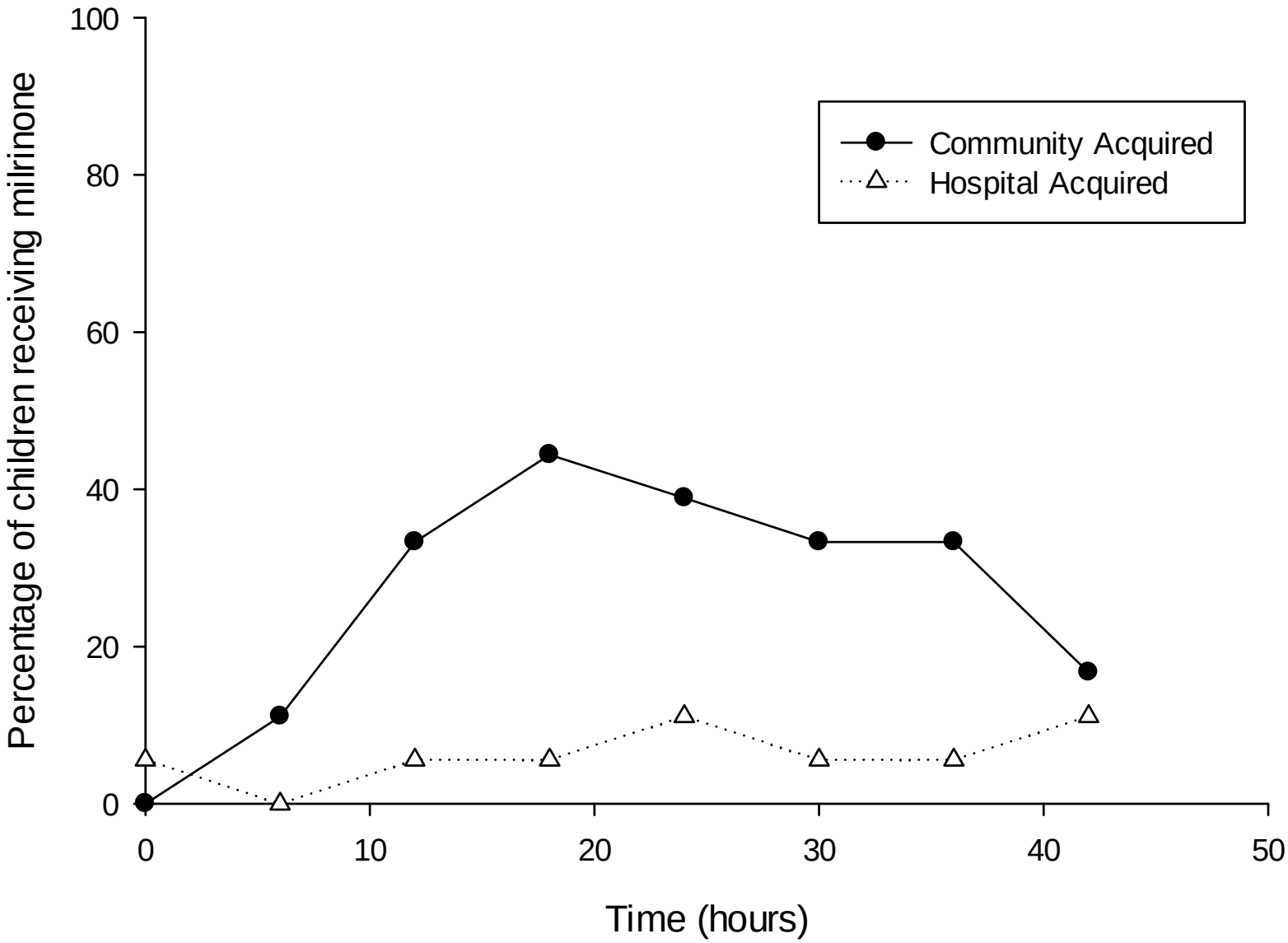


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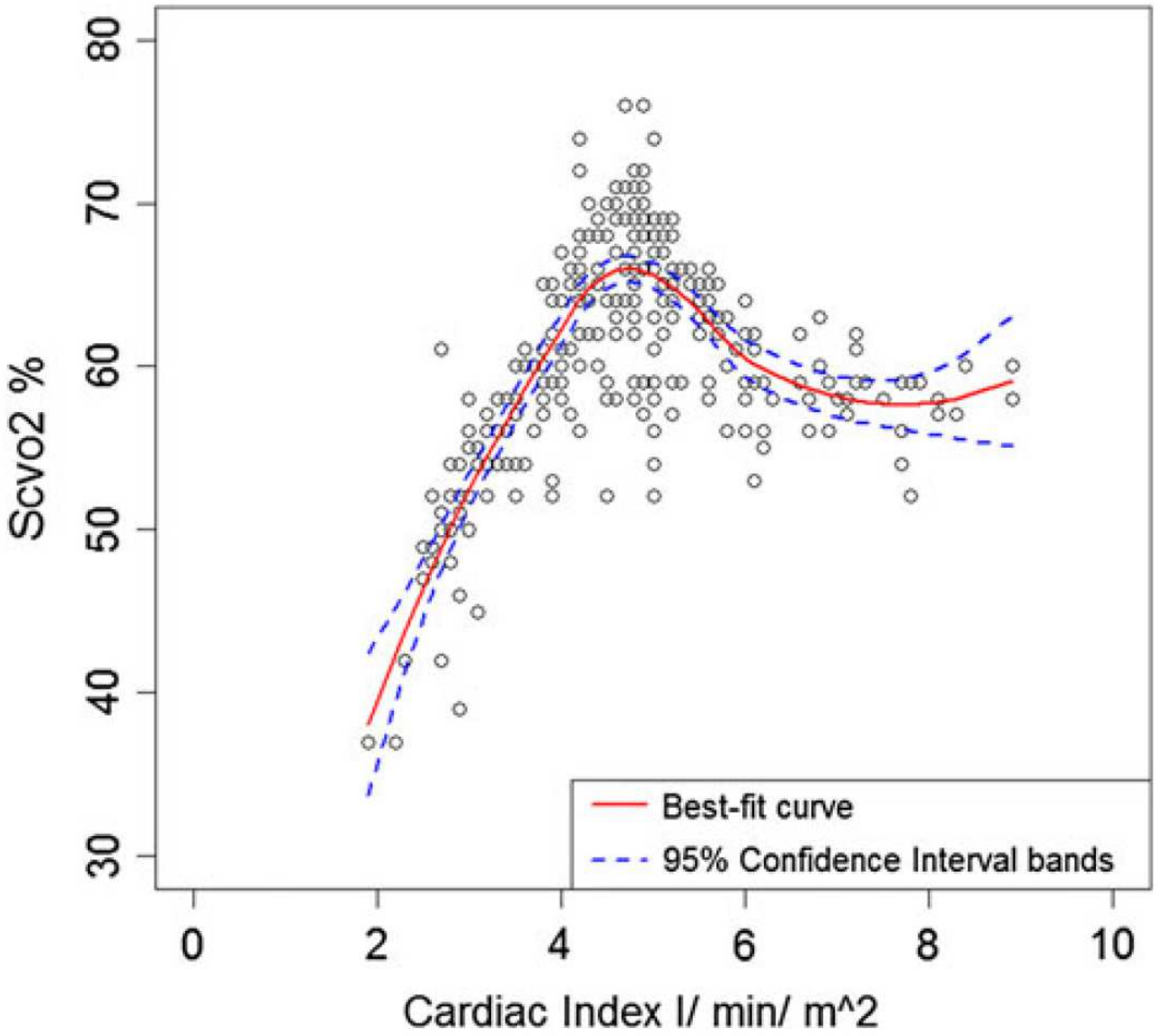


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# A Normal Capillary Refill Time of ≤ 2 Seconds is Associated with Superior Vena Cava Oxygen Saturations of ≥ 70%

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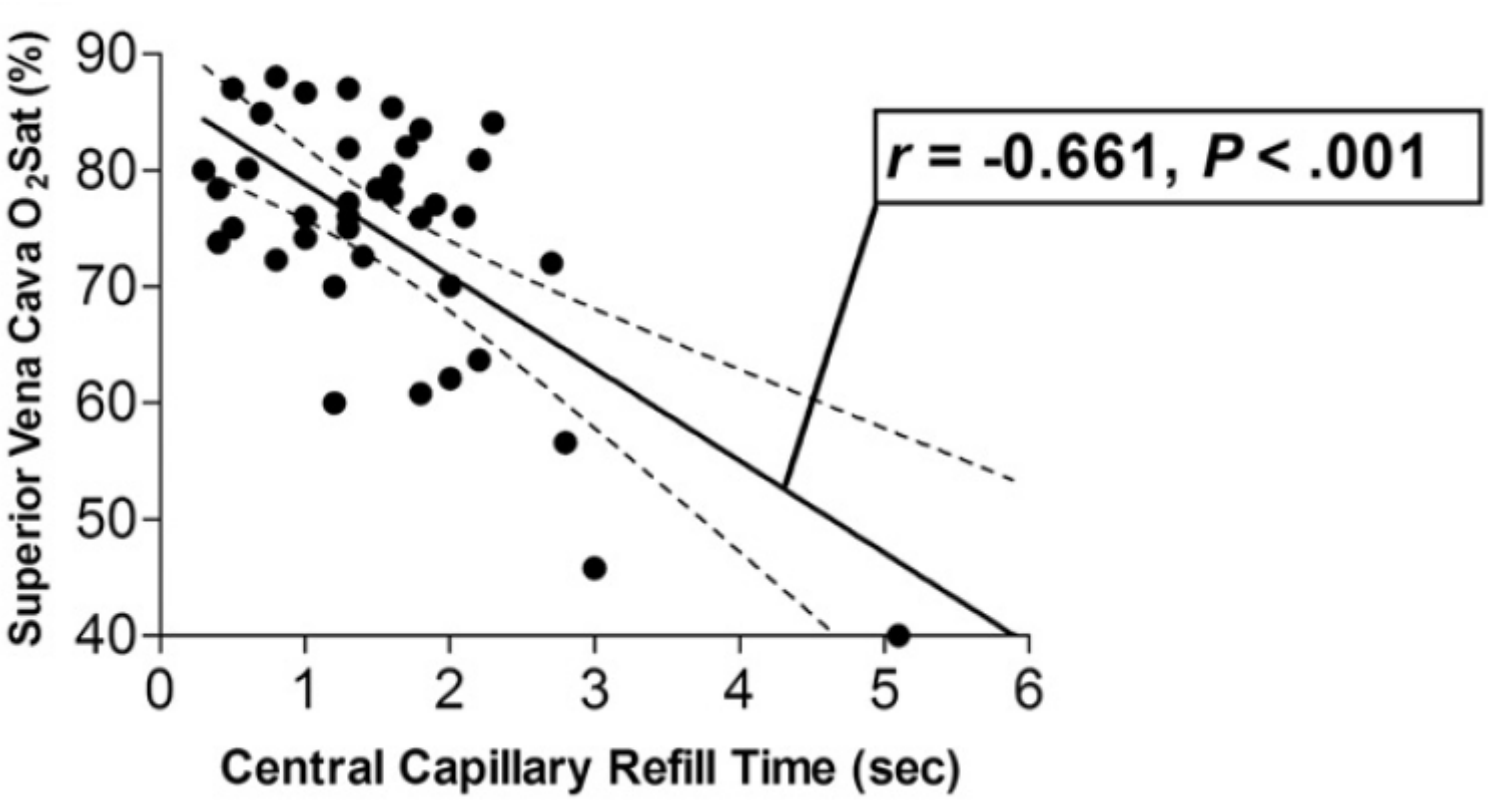
*J Pediatr 2011;158:968-72*



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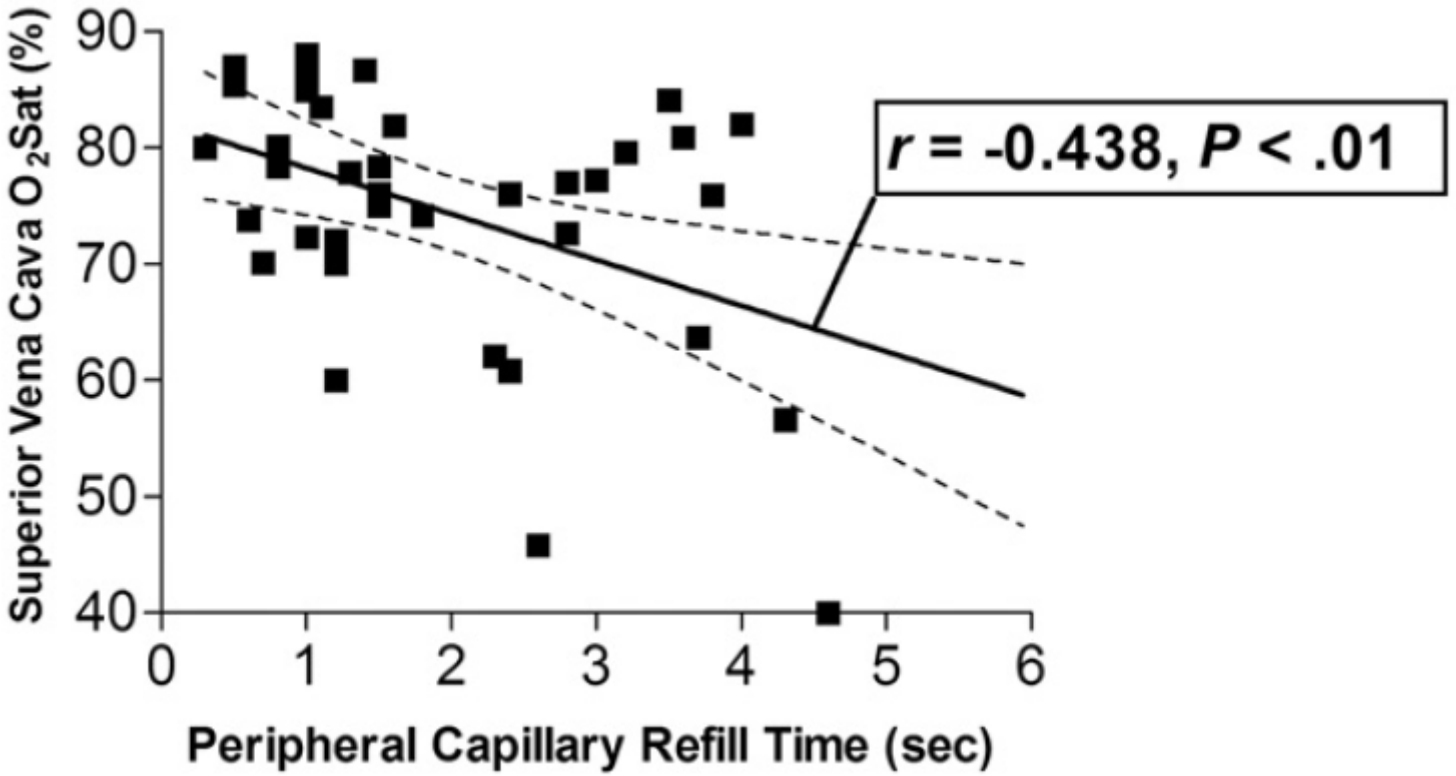

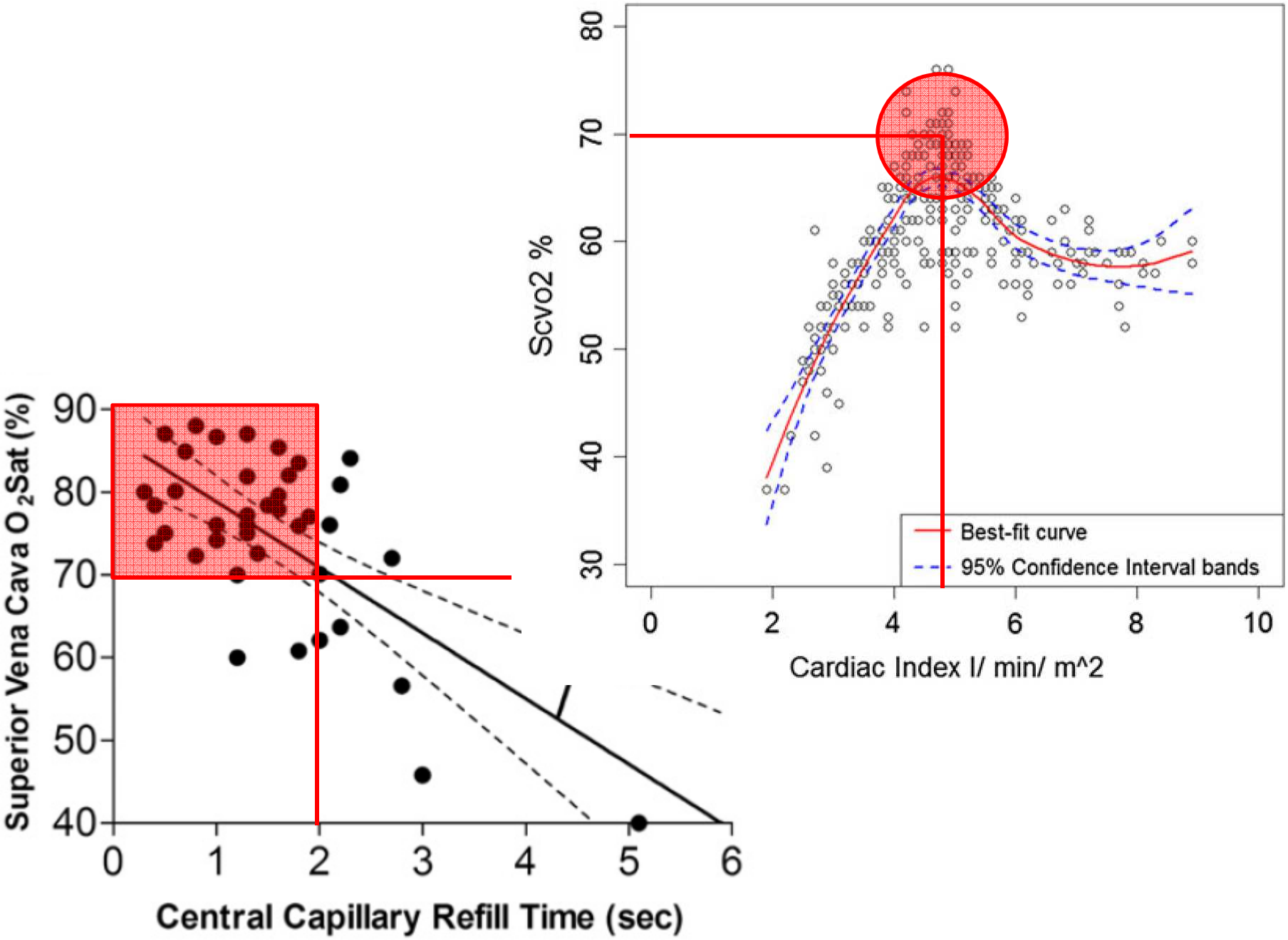
Scvo2 %
80
70
60
50
40
30
0
2
4
6
8
10
Cardiac Index l/ min/ m^2
Best-fit curve
95% Confidence Interval bands
Superior Vena Cava O2Sat (%)
90
80
70
60
50
40
0
1
2
3
4
5
6
Central Capillary Refill Time (sec)