PRÆHOSPITAL PERIMORTEM SECTIO

– ANÆSTESIOLOGISKE OVERVEJELSER

Tværfagligt Obstetrisk Symposium
29. Marts 2023

Baggrund

- Jens Christian Schmidt
- Speciallæge i anæstesi
- Afdelingslæge, anæstesiafdeling D (gyn/obs), Odense Universitetshospital
- Kører på 2 akutlægebiler i Region Syddanmark (Aabenraa og Sønderborg)
- Site investigator (VAM-IHCA – JAMA sep/2021)
- Tidl. KVALITATIV forskning

- SSAI-kursist, anæstesiologisk obstetrik

DASAIM

NYHEDER | ORGANISATION | MØDER OG KURSER | VEJLEDNINGER

- Etik
- Intensiv Terapi
- Klinisk Anæstesi
- Neuroanæstesi og -intensiv
- **Obstetrisk anæstesi**
- Præhospital, interhospital
- Thoraxanæstesi og -intensiv
- Smertebehandling
- Sundhedsstyrelsen

Klinisk vejledning udarbejdet af en arbejdsgruppe under DASAIM i samarbejde med DSOG og Dansk Kirurgisk Selskab. Juni 2022

| 30. April 2021 | 708 KB

Vejledning vedrørende anæstesi og amning

DASAIMs rekommandation vedrørende anæstesi og amning. Udarbejdet af DASAIMs udvalg for obstetrisk anæstesi og anæstesiudvalget. Næste revision 2023

| 15. February 2021 | 676 KB

Medicinsk smertelindring under fødslen

Dette dokument er en fælles guideline for DSOG, Jordemoderforeningen og DSKF med bidrag fra det obstetriske udvalg i DASAIM.

| 4. January 2021 | 103 KB

Fødselsanalgesi og anæstesi til fødende med COVID

Vejledningen er baseret ud fra nuværende viden og vil blive opdateret løbende. Revideret januar 2022

| 9. August 2017 | 2 MB

Præeklampsi/eklampsi – en klinisk guideline

Revideret 2016 af obstetrisk anæstesiudvalg

| 23. June 2015 | 505 KB

Lattergas som smertelindring ved fødsler

Statusdokument om brug af lattergas til fødsler, udarbejdet af DASAIM og DSOG. Senest revideret maj 2015

| 23. October 2014 | 2 MB

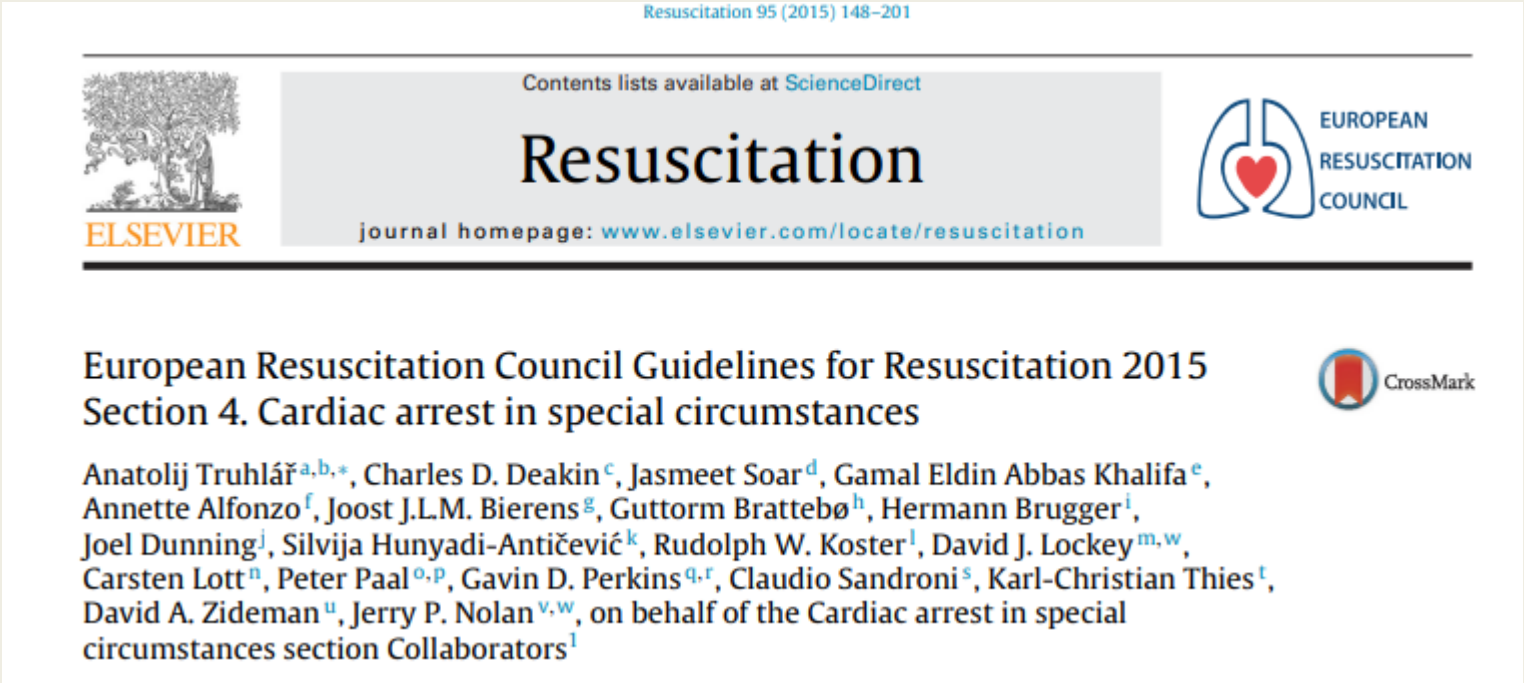
Anæstesi til kejsersnit

Udarbejdet af Obstetrisk anæstesiudvalg, DASAIM, oktober 2019. Revideres næste gang november 2022

| 20. October 2014 | 3 MB

Genoplivning af den obstetriske patient

DASAIMs obestetriske anæstesiudvalg har udarbejdet endorsement af ERC´s afsnit om hjertestop hos gravide. Maj 2020



Resuscitation 95 (2015) 148–201

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

European Resuscitation Council Guidelines for Resuscitation 2015
Section 4. Cardiac arrest in special circumstances

Anatolij Truhlář[a,b,*], Charles D. Deakin[c], Jasmeet Soar[d], Gamal Eldin Abbas Khalifa[e], Annette Alfonzo[f], Joost J.L.M. Bierens[g], Guttorm Brattebø[h], Hermann Brugger[i], Joel Dunning[j], Silvija Hunyadi-Antičević[k], Rudolph W. Koster[l], David J. Lockey[m,w], Carsten Lott[n], Peter Paal[o,p], Gavin D. Perkins[q,r], Claudio Sandroni[s], Karl-Christian Thies[t], David A. Zideman[u], Jerry P. Nolan[v,w], on behalf of the Cardiac arrest in special circumstances section Collaborators[1]

- Perimortem sectio efter 20. graviditetsuge:
  - Indiceret inden 5 minutters hjertestop mhp. maximal cavaaflastning

DSOG

Dansk Selskab for Obstetrik og Gynækologi

Nyheder DSOG Guidelines COVID-19 Nyhedsbreve Kodning & Data Årlige møder Uddannelse NFOG lærebog Kalender DSOG mener

Obstetriske guidelinemøder

Rekommandationer (2022)	Evidensgrad
Forebyggelse af maternelt kollaps ved tidlig opsporing af kritisk sygdom med standardiseret obstetrisk observationssystem (**NY 2022**)	**D**
Maternelt kollaps skal håndteres efter gældende principper for ABCDE-tilgang - dog med enkelte modifikationer grundet den ændrede fysiologi (**NY 2022**)	**D**
Cirkulatorisk kollaps i relation til graviditet kræver resolut indgriben af et tværfagligt team som indbefatter erfarent obstetrisk og anæstesiologisk personale.	**D**
Fri luftvej og tilførsel af 100% O2 med højt flow. Ved mistanke om truet luftvej tilkaldes anæstesiologisk assistance mhp. luftvejshåndtering **(NY 2022)**	**D**
Fuldt venstredrejet sideleje ved maternelt kollaps uden hjertestop (**NY 2022**)	**D**
To store i.v. adgange etableres over diafragma (**NY 2022**)	**D**
Overvej reversible årsager af den kritiske tilstand tidligt.	**C (NY 2022)**
Ved hjertestop aktiveres hjertestop-kald straks. Tilkald desuden erfaren obstetriker og anæstesiolog samt neonatalt team. (**NY 2022**)	**D**

Ved genoplivning efter 20. gestationsuge skal trykket fra den gravide uterus på vena cava inferior og aorta reduceres under genoplivning ved manuel displacering af uterus. **(Rev. 2022)**	**C**
Genoplivning ved hjertelungeredning påbegyndes så snart hjertestop er identificeret. Hjertelungeredning skal foregå efter gældende retningslinjer.	**B**
Tidspunktet for diagnose af hjertestop skal altid noteres.	**D**
Ved hjertemassage skal hændernes placeres som hos ikke-gravide. (**NY 2022**)	**D**
Respiratorisk resuscitering kan være besværet af den gravide uterus og måling af iltsaturation er lige så vigtig som måling af puls og blodtryk.	**D (NY 2022)**
Ved hjertestop anvendes en trinvis tilgang til luftvejshåndtering (som hos ikke-gravide). Ved behov for orotrakeal intubation bør dette udføres af en erfaren intubatør. (**NY 2022**)	**D**
Barnets tilstand er sekundært i den akutte situation og forsøg på at undersøge for føtal hjertelyd er tidsspilde og skal undgås. Pædiater skal altid tilkaldes akut når man planlægger akut forløsning.	**D**
Ved defibrillering anvendes almindelige energimængder til voksne.	**B**
Ved hjertestop er algoritmen for administration af farmaka og deres dosering som hos ikke-gravide. (**NY 2022**)	**D**

Under HLR bør man overveje reversible årsager til hjertestop hos gravide (**NY 2022**)	**C**
Da hypovolæmi er den væsentlige korrigerbare ætiologi bør der infunderes isoton natriumklorid hurtigst muligt. Overvej O neg blod hvis der er sandsynlighed for blødning.	**B**
Ved manglende respons på effektiv HLR indenfor 4 minutter skal akut forløsning ved perimortem sectio overvejes. Barnet skal være forløst inden for 5 minutter.	**D (NY 2022)**
Ved indikation for perimortem sectio skal patienten ikke transporteres til operationsstue først. Indgrebet bør udføres på stedet, udføres rent og uden anæstesi.	**A**
I tilfælde af genoprettet cirkulation og fortsat graviditet, lægges patienten i venstre sideleje, fostermonitorering genoptages og specialiseret efterbehandling varetages tværfagligt (**NY 2022**)	**D**
Teamtræning af obstetrisk kollaps og hjertestop anbefales indført mindst én gang årligt på de danske fødeafdelinger, da det forbedrer det kliniske udkomme. **(Rev. 2022)**	**B (NY 2022)**

BJOG An International Journal of Obstetrics and Gynaecology

DOI: 10.1111/1471-0528.14521
www.bjog.org

General obstetrics

The CAPS Study: incidence, management and outcomes of cardiac arrest in pregnancy in the UK: a prospective, descriptive study

VA Beckett,[a] M Knight,[b] P Sharpe[c]

[a] Bradford Teaching Hospitals NHS Foundation Trust, Bradford, UK [b] National Perinatal Epidemiology Unit, University of Oxford, Oxford, UK [c] University Hospitals of Leicester NHS Trust, Leicester, UK
Correspondence: VA Beckett, Department of Obstetrics & Gynaecology, Bradford Teaching Hospitals NHS Foundation Trust, Bradford, BD9 6RJ, UK. Email virginia.beckett@bthft.nhs.uk

Accepted 5 December 2016. Published Online 24 February 2017.

This article includes Author Insights, a video abstract available at https://vimeo.com/rcog/authorinsights14521.

Objective To describe the incidence, risks, management and outcomes of cardiac arrest in pregnancy in the UK population, with specific focus on the use of perimortem caesarean section (PMCS).

Design A prospective, descriptive study using the UK Obstetric Surveillance System (UKOSS).

Setting All UK hospitals with maternity units.

Population All women who received basic life support in pregnancy in the UK between 1 July 2011 and 30 June 2014 (n = 66).

Methods Prospective case identification through UKOSS monthly mailing.

Main outcome measures Cardiac arrest in pregnancy, PMCS, maternal death.

Results There were 66 cardiac arrests in pregnancy, resulting in an incidence of 2.78 per 100 000 maternities (1:36 000; 95% CI 2.2–3.6). In all, 28 women died (case fatality rate 42%); 16 women arrested solely as a consequence of obstetric anaesthesia, 12 of whom were obese. Basic and advanced life support were rapidly delivered. Those who died were more likely to have collapsed at home. Perimortem caesarean section was performed in 49 women, 11 in the emergency department. The time from collapse to PMCS was significantly shorter in women who survived (median interval 3 versus 12 minutes, P = 0.001). Forty-six of 58 babies were born alive; 32 babies to surviving mothers and 14 to women who died.

Conclusion Cardiac arrest is rare in the pregnant UK population, however, nearly a quarter of cases are precipitated by obstetric anaesthesia, suggesting an opportunity to reduce the incidence further. Maternal survival rates of 58% were achieved with timely resuscitation, including PMCS, delay in which was associated with maternal death. Inpatient arrests were associated with higher survival rates than arrests that occurred outside the hospital setting.

Keywords Cardiac arrest, maternal morbidity, maternal mortality, perimortem caesarean section, resuscitation.

Tweetable abstract 25% of cardiac arrest in pregnancy is caused by anaesthesia. Rapid perimortem section improves survival.

Linked article This article is commented on by JM Mhyre and Bateman, p. 1382 in this issue. To view this mini commentary visit https://doi.org/10.1111/1471-0528.14569. This article has journal club questions by BD Einerson, p. 1383 in this issue. To view these visit http://dx.doi.org/10.1111/1471-0528.14662.

Please cite this paper as: Beckett VA, Knight M, Sharpe P. The CAPS Study: incidence, management and outcomes of cardiac arrest in pregnancy in the UK: a prospective, descriptive study. BJOG 2017;124:1374–1381.

Introduction

Estimates suggest that cardiac arrest in pregnancy occurs in around 1 in 30 000 pregnancies.[1] However, there has been no recent assessment of this rate despite the increasing age and morbidity of the antenatal population in the UK. The UK Confidential Enquiry into Maternal Deaths report for the 2003–5 triennium noted 52 women who had undergone perimortem caesarean section (PMCS).[2] The outcome for the mother in these cases was clearly fatal, as they were identified from within the population of women who died. The number of women managed

Editorial > Resuscitation. 2019 Feb;135:224-225. doi: 10.1016/j.resuscitation.2018.11.021. Epub 2018 Dec 30.

Born to survive: A critical review of out-of-hospital maternal cardiac arrests and pre-hospital perimortem caesarean section

S L Hillman [1], N C Cooper [1], D Siassakos [2]

Affiliations + expand

PMID: 30599181 DOI: 10.1016/j.resuscitation.2018.11.021

- Tid til ROSC stærkt associeret til overlevelse
- Tid til PPS associeret til overlevelse, da hysterotomi ofte er den eneste måde at opnå ROSC

Management of pregnancy and obstetric complications in prehospital trauma care: prehospital resuscitative hysterotomy/perimortem caesarean section

Emir Battaloglu, Keith Porter

Academic Department of Clinical Traumatology, Queen Elizabeth Hospital Birmingham, University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK

Correspondence to
Emir Battaloglu, Academic Department of Clinical Traumatology, Queen Elizabeth Hospital Birmingham, University Hospitals Birmingham NHS Foundation Trust, 6th Floor, Nuffield House, Mindelsohn Way, Edgbaston, Birmingham B15 2TH, UK; e.battaloglu@nhs.net

Received 18 April 2016
Revised 12 January 2017
Accepted 25 January 2017
Published Online First
7 March 2017

ABSTRACT

The need for prehospital resuscitative hysterotomy/perimortem caesarean section is rare. The procedures can be daunting and clinically challenging for practitioners. Maternal death can be averted by swift and decisive action. This guideline serves to inform prehospital practitioners about conducting maternal resuscitation following cardiac arrest, provides an evidence-based framework to support decision making and highlights areas for improvement in prehospital care.

INTRODUCTION

Performing 'resuscitative hysterotomy/perimortem caesarean section' (RH/PMCS) can be a daunting prospect for any healthcare professional, including experienced obstetricians. Success may save a family, yet failure or failure to act may mean the loss of two lives. The rarity of maternal cardiac arrest, 1 in 30 000 pregnancies,[1 2] means the likelihood of encountering such a case is limited to once in a career. Yet the speed of decision making is likely to be critical in determining the outcome.

There are historical descriptions of perimortem fetal extractions, thought to be dated as early as 715 BC, when Roman King Numa Pompilius decreed 'no child should be buried within its mother'.[3] In 1982, the neurologically intact survival of a mother and child after caesarean section following 20 min of cardiopulmonary resuscitation (CPR) during an inhospital cardiac arrest was the first recorded case in modern literature.[4]

Worldwide, especially from North American literature, trauma is reported as the leading cause of indirect maternal mortality and of fetal demise.[5] Traumatic cardiac arrest is associated with poor clinical outcome, and unfortunately survival rates remain very low.[6 7]

Indirect maternal mortality causes in the UK, as listed in the Confidential Enquiry into Maternal

physiological modifications of late-term pregnant women mean a heightened need for protection of the airway from aspiration of gastric contents and to relieve uterine caval compression.

CPR, through precordial compressions, in pregnant patients only generates 10%–30% of normal cardiac output, and it can be very difficult to achieve perfusion of vital organs.[10 11]

CPR has the potential to be significantly more effective following emptying of the gravid uterus. Profound changes in cardiovascular physiology occur during pregnancy. In particular, uterine blood flow, as a percentage of cardiac output, increases from 2% in the non-pregnant state to 18% during the third trimester.[12 13] Emptying of the uterus following normal delivery results in a 60%–80% decrease in the cardiac output requirement of the uterus, but following caesarean section this is closer to a 30% decrease. Emptying the uterus also serves to relieve the deleterious effects of caval compression. Therefore, an increased likelihood of maternal survival is achieved from the improved vital circulatory volume and increased cardiac output following delivery of the baby.[14]

'Resuscitative hysterotomy' (RH) is the term used for the procedure throughout this document to highlight the integral nature of the procedure following maternal cardiac arrest, akin to resuscitative thoracotomy for penetrating thoracic injury. RH is synonymous with the term 'perimortem caesarean section' (PMCS). The procedure is intended for maternal benefit only following maternal cardiac arrest.

There is limited evidence pertaining to the specific management of pregnant patients during cardiac arrest. Therefore, scrutiny and distillation of available literature, together with expert opinion, have been used to develop these recommendations for prehospital environment to serve as a guide in the rare but stressful event of traumatic cardiac arrest during pregnancy.

CPR, through precordial compressions, in pregnant patients only generates 10%–30% of normal cardiac output, and it can be very difficult to achieve perfusion of vital organs

- Del Guercio LRM, Feins NR, Cohn JD, et al. Comparison of blood flow during external and internal cardiac massage in man. Surv Anesthesiol 1966;10:146–7

  Dijkman A, Huisman CM, Smit M, et al. Cardiac arrest in pregnancy: increasing use of perimortem caesarean section due to emergency skills training?. BJOG 2010;117:282–7

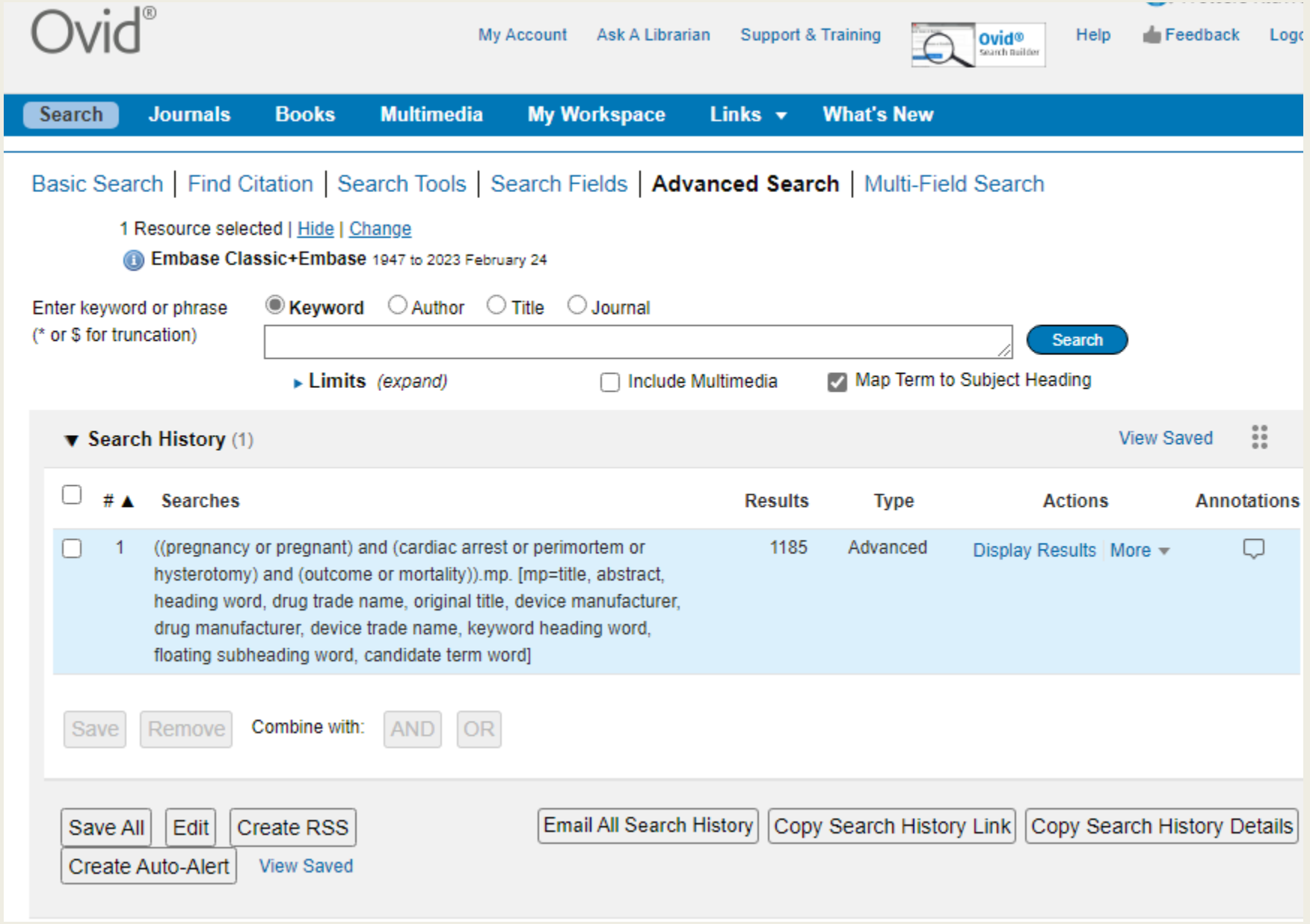
Uterine blood flow, as a percentage of cardiac output, increases from 2% in the non-pregnant state to 18% during the third trimester

- Bieniarz J, Maqueda E, Caldeyro-Barcia R. Compression of aorta by the uterus in late human pregnancy. I. Variations between femoral and brachial artery pressure with changes from hypertension to hypotension. Am J Obstet Gynecol 1966;95:795–808

- Bieniarz J, Yoshida T, Romero-Salinas G, et al. Aortocaval compression by the uterus in late human pregnancy. IV. Circulatory homeostasis by preferential perfusion of the placenta. Am J Obstet Gynecol 1969;103:19

Emptying of the uterus (C-section) results in a 30% decrease in the cardiac output requirement of the uterus

- 4 Hill CC, Pickinpaugh J. Trauma and surgical emergencies in the obstetric patient. Surg Clin North Am 2008;88:421–40


Ovid®
My Account
Ask A Librarian
Support & Training
Ovid® Search Builder
Help
Feedback
Logo
Search
Journals
Books
Multimedia
My Workspace
Links
What's New
Basic Search | Find Citation | Search Tools | Search Fields | Advanced Search | Multi-Field Search
1 Resource selected | Hide | Change
Embase Classic+Embase 1947 to 2023 February 24
Enter keyword or phrase
(* or $ for truncation)
Keyword
Author
Title
Journal
Search
Limits (expand)
Include Multimedia
Map Term to Subject Heading
Search History (1)
View Saved
▲
Searches
Results
Type
Actions
Annotations
1
((pregnancy or pregnant) and (cardiac arrest or perimortem or hysterotomy) and (outcome or mortality)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]
1185
Advanced
Display Results
More
Save
Remove
Combine with:
AND
OR
Save All
Edit
Create RSS
Create Auto-Alert
View Saved
Email All Search History
Copy Search History Link
Copy Search History Details

Contents lists available at SciVerse ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Review article

Maternal cardiac arrest and perimortem caesarean delivery: Evidence or expert-based?☆,☆☆

Sharon Einav[a,*], Nechama Kaufman[a,b], Hen Y. Sela[c]

[a] The General Intensive Care Unit of the Shaare Zedek Medical Centre, Jerusalem, Israel
[b] The Department of Emergency Medicine of the Shaare Zedek Medical Centre, Jerusalem, Israel
[c] The Department of Obstetrics and Gynaecology, Division of Maternal Fetal Medicine, Columbia University Medical Center, New York, USA

ARTICLE INFO

Article history:
Received 26 January 2012
Received in revised form 29 April 2012
Accepted 2 May 2012

Keywords:
Heart arrest
Death
Sudden
Cardiac
Cardiopulmonary resuscitation
Pregnancy
Caesarean section
Hysterotomy

ABSTRACT

Aim: To examine the outcomes of maternal cardiac arrest and the evidence for the 4-min time frame from arrest to perimortem caesarean delivery (PMCD) recommended in current resuscitation and obstetric guidelines.

Data sources and methods: Review and data extraction from all reported maternal cardiac arrests occurring prior to delivery (1980–2010). Cases were included if they provided details regarding both the event and outcomes. Outcomes of arrest were assessed using survival, Cerebral Performance Category (CPC) and maternal/neonatal harm/benefit from PMCD. Outcome measures were maternal and neonatal survival.

Results: Of 1594 manuscripts screened, 156 underwent full review. Data extracted from 80 relevant papers yielded 94 included cases. *Maternal outcome*: 54.3% (51/94) of mothers survived to hospital discharge, 78.4% (40/51) with a CPC of 1/2. PMCD was determined to have been beneficial to the mother in 31.7% of cases and was not harmful in any case. In-hospital arrest and PMCD within 10 min of arrest were associated with better maternal outcomes (ORs 5.17 and 7.42 respectively, $p < 0.05$ both). *Neonatal outcome*: mean times from arrest to delivery were 14 ± 11 min and 22 ± 13 min in survivors and non-survivors respectively (receiver operating area under the curve 0.729). Neonatal survival was only associated with in-hospital maternal arrest (OR 13.0, $p < 0.001$).

Conclusions: Treatment recommendations should include a low admission threshold to a highly monitored area for pregnant women with cardiorespiratory decompensation, good overall performance of resuscitation and delivery within 10 min of arrest. Cognitive dissonance may delay both situation recognition and the response to maternal collapse.

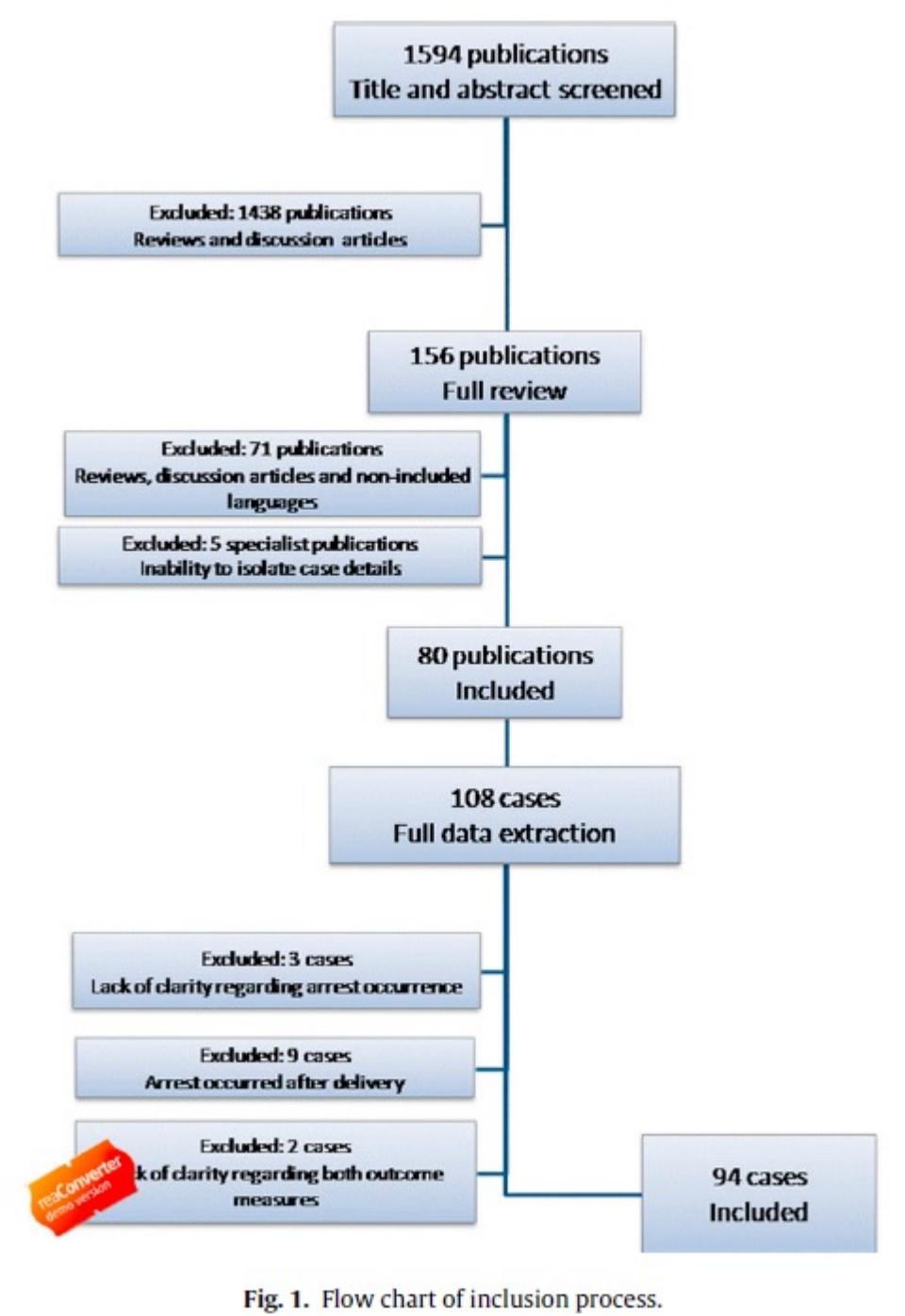
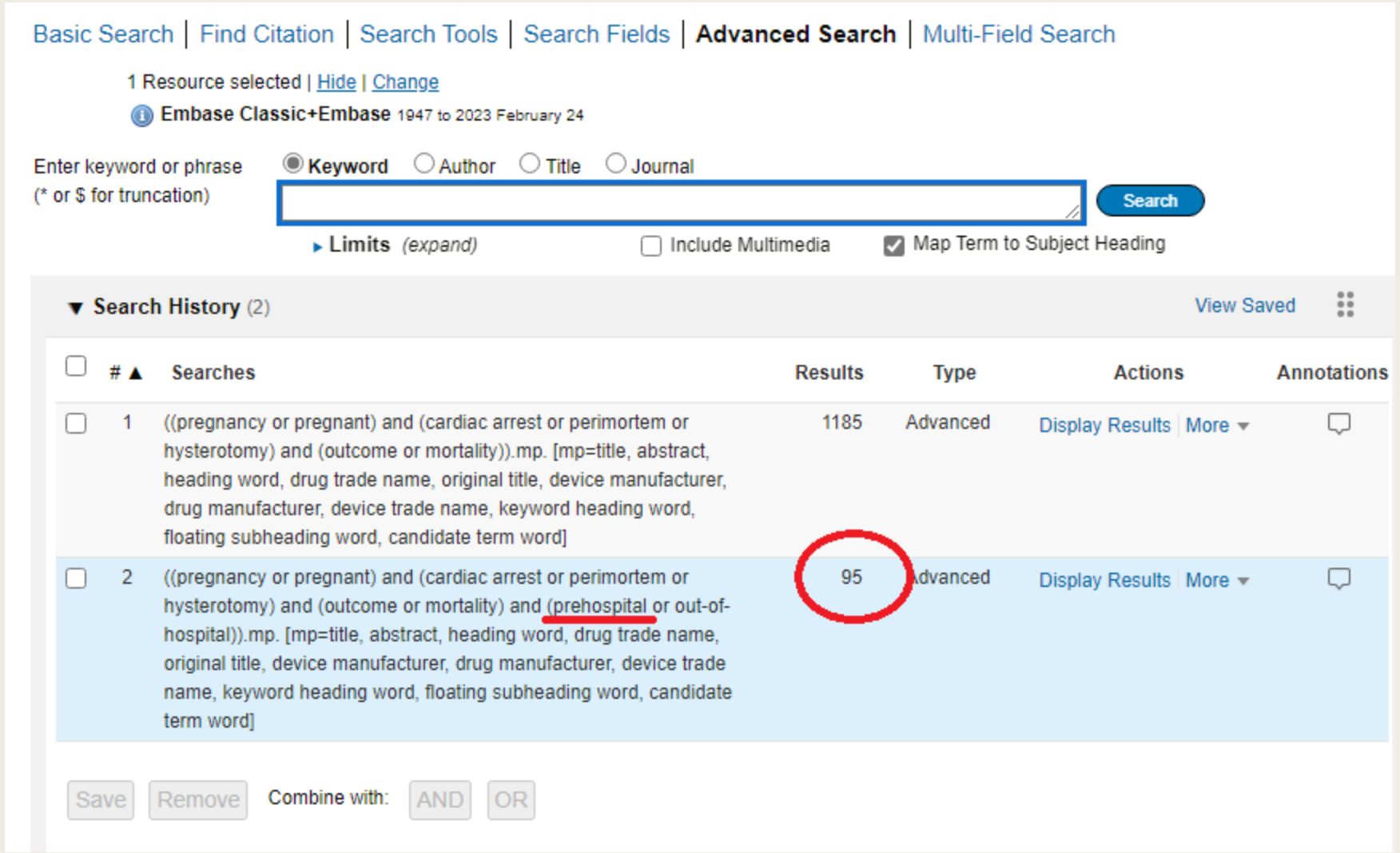


Fig. 1. Flow chart of inclusion process.

- In-hospital setting
- 57 cases (60%) rapporterede tid til PMC (BIAS)
- Gennemsnitstid for PMC 16,6 min +/- 12,5 min

- Kun 4 cases når PMC <4 min
- Høj overlevelse (ROSC 57%, discarge 54%)


Basic Search | Find Citation | Search Tools | Search Fields | Advanced Search | Multi-Field Search
1 Resource selected | Hide | Change
Embase Classic+Embase 1947 to 2023 February 24
Enter keyword or phrase
(* or $ for truncation)
Keyword Author Title Journal
Search
Limits (expand)
Include Multimedia
Map Term to Subject Heading
Search History (2)
View Saved
▲ Searches Results Type Actions Annotations
1 ((pregnancy or pregnant) and (cardiac arrest or perimortem or hysterotomy) and (outcome or mortality)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] 1185 Advanced Display Results More
2 ((pregnancy or pregnant) and (cardiac arrest or perimortem or hysterotomy) and (outcome or mortality) and (prehospital or out-of-hospital)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] 95 Advanced Display Results More
Save Remove Combine with: AND OR

RESUSCITATION 153 (2019) 205–211

Available online at www.sciencedirect.com

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Maternal out-of-hospital cardiac arrest: A retrospective observational study

Olga Maurin[a], *Sabine Lemoine*[a,*], *Daniel Jost*[a,b], *Vincent Lanoë*[a], *Aurelien Renard*[c], *Stephane Travers*[a], *the Paris Fire Brigade Cardiac Arrest Work Group*[a], *Frederic Lapostolle*[d], *Jean Pierre Tourtier*[a]

[a] *Paris Fire Brigade Medical Emergency Department, Paris, France*
[b] *Sudden Death Expertise Center (SDEC), INSERM U970, Paris, France*
[c] *Military Teaching Hospital, HIA Sainte Anne, Emergency Department, Toulon, France*
[d] *AP-HP, Emergency Medical Service Department (SAMU) 93, Avicenne Hospital, INSERM U942, Bobigny, France*

Abstract

Aim: Out-of-hospital cardiac arrests (OHCAs) in pregnant women are rare events. In this study, we aimed to describe a cohort of pregnant women who experienced OHCAs in a large urban area, and received treatment by the prehospital teams in a two-tiered emergency response system.

Methods: This retrospective study included pregnant women over 18 years of age who experienced OHCAs. The analysed variables included maternal age, gestational age, variables specific to the rescue system, number of shocks delivered by an automatic external defibrillator, and rates of maternal and neonatal survival.

Results: Over the 5-year study period, 19,515 OHCAs occurred, 16 of which were in pregnant women. These 16 patients had a median age of 31 years [interquartile range (IQR): 28–35] and a median gestational age of 20 weeks [IQR: 10–33]. Three patients (18.8%) had an initial rhythm of ventricular fibrillation. Only one patient underwent thrombolysis. Of the 16 patients, 6 (38%) died after resuscitation on the scene. The remaining 10 were transported to the hospital, of whom 5 achieved circulation through a mechanical CPR device. Only 2 patients were alive 30 days after OHCA.

Conclusions: Over half of the pregnant women who experienced OHCA were at least 20 weeks pregnant. Analysis of the prehospital medical data suggests that the current recommendations are difficult to apply in an out-of-hospital environment. Specific recommendations for this situation must be developed.

Keywords: Out-of-hospital cardiac arrest, Pregnancy, Perimortem caesarean section, Extracorporeal membrane oxygenation, Thrombolysis, Maternofoetal outcomes

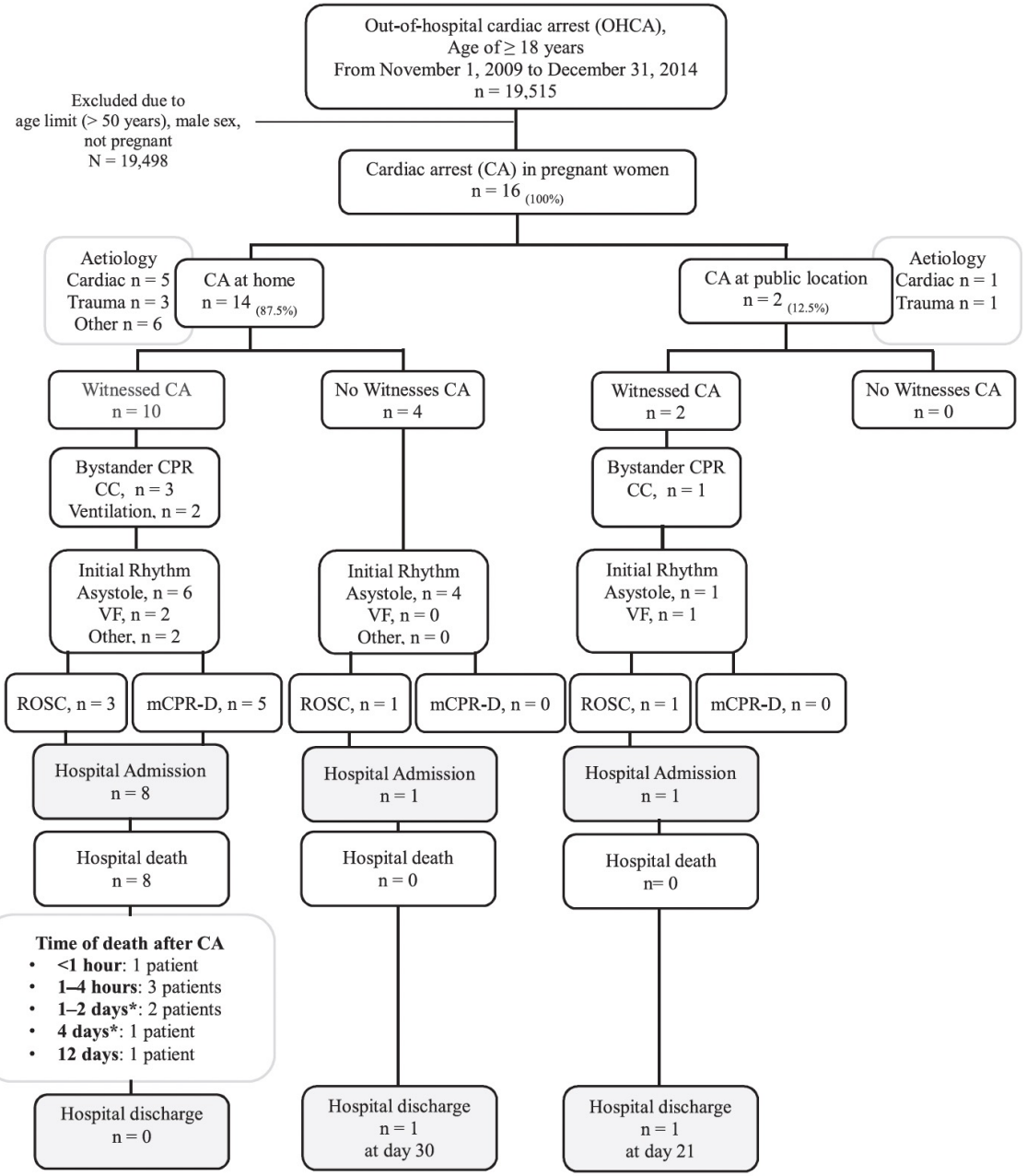


Fig. 1 – Flow chart of pregnant women suffering from out-of-hospital cardiac arrest with Utstein Style reporting. CA: cardiac arrest, CPR: cardiopulmonary resuscitation, CC: chest compressions, mCPR-D: mechanical CPR device, VF: ventricular fibrillation, ROSC: return of spontaneous circulation.
***Perimortem caesarean section.**

Table 2 – Prehospital care and maternofoetal outcomes according to term of pregnant women suffering from out-of-hospital cardiac arrest.

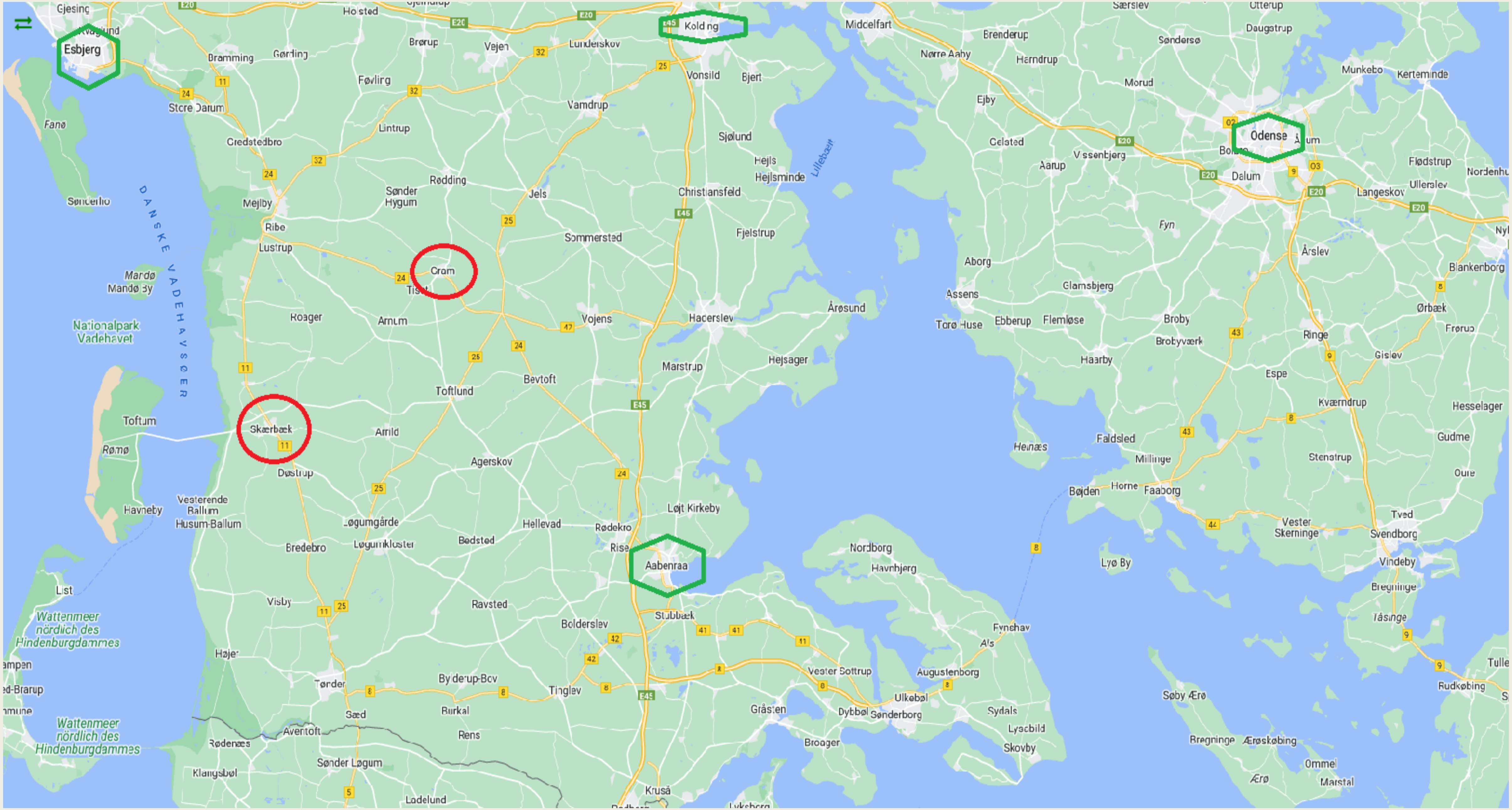
	Term in weeks (n = 16)		Aetiology	Prehospital ROSC	Prehospital cumulated epinephrine (mg) given by ALS	Prehospital EES delivered	CPR status at hospital arrival	In hospital PMCS	Time from CA to PMCS	Survival to hospital discharge	
										Maternal	Foetal
P1	**<14 weeks**	**6**	Cardiac	**Yes**	3	**Yes**	No CC needed	–	–	**Yes**	No
P2		**7**	Cardiac	**Yes**	5	**Yes**	No CC needed	–	–	**Yes**	**Yes**
P3		**8**	Unknown[a]	**Yes**	10	**Yes**	No CC needed	–	–	No	No
P4		**10**	Traumatic	No	14	No	–	–	–	No	No
P5		**10**	Unknown[a]	No	*mv*	No	With mCPR-D	–	–	No	No
P6	**14–26/28 weeks**	**15**	*mv*	No	10	No	–	–	–	No	No
P7		**20**	Cardiac	**Yes**	15	No	No CC needed	No	–	No	No
P8		**20**	Traumatic	No	15	No	–	No	–	No	No
P9	**>26/28 weeks**	**31**	Cardiac	No	15	No	With mCPR-D	No		No	No
P10		**31**	Other[b]	**Yes**	*mv*	No	No CC Needed	**Yes**	90 min	No	No
P11		**33**	*mv*	No	5	No	–	–	–	No	No
P12		**34**	Cardiac	No	*mv*	No	With mCPR-D	No	–	No	No
P13		**37**	Cardiac	No	10	**Yes**	With mCPR-D	**Yes**	55 min	No	No
P14		**39**	Unknown[a]	No	18	**Yes**	With mCPR-D	**Yes**	110 min	No	No
P15		**>26/28**	Traumatic	No	5	No	–	No	–	No	No
P16		**>26/28**	Traumatic	No	*mv*	No	–	No	–	No	No

P: patient, ROSC: return of spontaneous circulation, ALS: advanced life support, EES: external electric shock, PMCS: perimortem caesarean section, min: minutes, mg: milligrams, mCPR-D: mechanical CPR device, CA: cardiac arrest, mv: missing value, CC: chest compressions.

–Not relevant for patient.

[a] Three aetiologies remained unknown after hospital investigations.

[b] Other for hypoxic cardiac arrest after epileptic seizures.


Esbjerg
Kolding
Odense
Aabenraa
Gram
Skærbæk
Fanø
Sønderho
Mandø By
Nationalpark Vadehavet
DANSKE VADEHAVSØER
Toftum
Rømø
Havneby
List
Wattenmeer nördlich des Hindenburgdammes
Højer
Tønder
Bramming
Gørding
Føvling
Vejen
Lunderskov
Brørup
Holsted
Store Darum
Credstedbro
Lintrup
Vamdrup
Vonsild
Bjert
Sjølund
Hejls
Hejlsminde
Christiansfeld
Fjelstrup
Mejlby
Ribe
Lustrup
Rødding
Sønder Hygum
Jels
Sommersted
Roager
Arnum
Vojens
Haderslev
Marstrup
Hejsager
Årøsund
Bevtoft
Toftlund
Arrild
Agerskov
Døstrup
Vesterende Ballum
Husum-Ballum
Løgumgårde
Løgumkloster
Bredebro
Bedsted
Hellevad
Rødekro
Rise
Løjt Kirkeby
Visby
Ravsted
Bolderslev
Stubbæk
Bylderup-Bov
Tinglev
Burkal
Rens
Sæd
Aventoft
Rodenæs
Klangsbøl
Sønder Løgum
Ladelund
Kruså
Gråsten
Broager
Vester Sottrup
Dybbøl
Sønderborg
Ulkebøl
Augustenborg
Nordborg
Havnbjerg
Fynshav
Als
Sydals
Lysabild
Skovby
Middelfart
Brenderup
Nørre Aaby
Harndrup
Ejby
Gelsted
Aarup
Vissenbjerg
Morud
Søndersø
Særslev
Otterup
Daugstrup
Munkebo
Kerteminde
Dalum
Fløjstrup
Ullerslev
Langeskov
Fyn
Årslev
Blankenborg
Aborg
Assens
Glamsbjerg
Tørø Huse
Ebberup
Flemløse
Broby
Brobyværk
Haarby
Ringe
Ørbæk
Frørup
Gislev
Espe
Kværndrup
Hesselager
Gudme
Helnæs
Faldsled
Millinge
Stenstrup
Oure
Bøjden
Horne
Faaborg
Vester Skerninge
Tved
Svendborg
Lyø By
Vindeby
Bregninge
Tåsinge
Søby Ærø
Bregninge
Ærøskøbing
Ærø
Ommel
Marstal
Rudkøbing
Lillebælt

Klinisk virkelighed

- 4 m2 køkken

Tvivlsom BLS

2 m2 ambulance

2 x nabo, 1 x 6-årig

Fornuftig etCO2

Køretid 15-20 min

Usikker ictus

Perimortem sectio i kard lab

23 mennesker på stuen

- Thorax kirurg
- Kardiologer
- Obstetriske kirurger
- Obstetrisk anæstesi

Hvorfor foretog du ikke resusciativ hysterotomi?

Best practice guideline

- Out of Hospital resusciativ hysterotomi bør udskydes, hvis transporttiden til hospital IKKE overstiger 5 min (Grade D)
- OHRH skal kun udføres hvis man har rette udstyr, kompetencerne og modet til at udføre indgrebet (Grade D)
- International konsensus papir fra 2016: ”All professionals with sufficient skills can perform PMCS and ‘cannot be criticized for attempting the procedure’”
- Selv om man teoretisk øger overlevelseschancer ved at udføre resusciativ hysterotomi, skal præhospital personale som undlader proceduren støttes i deres beslutning

Take home messages

- Genoplivning og resuscitering af gravide er stort set identisk med ditto for andre
- > GA 20+0 manuel displacering af uterus væk fra v. cava + aorta
- Identificer tidligt reversible årsager
- Overvej blødning, trombose (af forskellig slags) og PE
- Overvej tidligt perimortem sectio ved GA > 20 uger

Figur 1. *Teknikker til manuel displacering af uterus.* ***(A)*** *Manuel displacering af uterus ved én-hånds teknik.* ***(B)*** *Manuel displacering af uterus ved to-hånds teknik. Copyright: Sandbjerg Guidelines.*