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Paediatric death after withdrawal of life-sustaining therapies: a scoping review protocol

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ABSTRACT

Introduction The physiology of dying after withdrawal of life-sustaining measures (WLSM) is not well described in children. This lack of knowledge makes predicting the duration of the dying process difficult. For families, not knowing this process's duration interferes with planning of rituals related to dying, travel for distant relatives and emotional strain during the wait for death. Time-to-death also impacts end-of-life care and determines whether a child will be eligible for donation after circulatory determination of death. This scoping review will summarise the current literature about what is known about the dying process in children after WLSM in paediatric intensive care units (PICUs).

Methods and analysis This review will use Joanna Briggs Institute methodology for scoping reviews. Databases searched will include Ovid MEDLINE, Ovid Embase, Cochrane Central Register of Controlled Trials via EBM Reviews Ovid, Ovid PsycINFO, CINAHL and Web of Science. Literature reporting on the physiology of dying process after WLSM, or tools that predict time of death in children after WLSM among children aged 0–18 years in PICUs worldwide will be considered. Literature describing the impact of prediction or timing of death after WLSM on families, healthcare workers and the organ donation process will also be included. Quantitative and qualitative studies will be evaluated. Two independent reviewers will screen references by title and abstract, and then by full text, and complete data extraction and analysis.

Ethics and dissemination The review uses published data and does not require ethics review. Review results will be published in a peer-reviewed scientific journal.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This will be the first scoping review investigating what is known about the dying process in children after the withdrawal of life-sustaining measures (WLSM).
⇒ We will use a comprehensive search strategy and include and extensive body of literature to map the international literature around our topic of interest.
⇒ Results from our scoping review will be used guide clinical research related to the physiology of the dying process in paediatric intensive care units (PICUs).
⇒ We will only include articles in English and French and only focus on WLSM in PICUs and so may omit relevant evidence from other languages and exclude low-income countries.
⇒ We are using a scoping review methodology and to be congruent with our methods a quality appraisal of the included references will not be performed, but that may limit the applicability of our findings into clinical settings.

INTRODUCTION

Children die in different settings depending on many factors including geographical location, socioeconomic status and medical complexity.[1 2] Most paediatric deaths in high-income countries occur in hospital settings and the majority of these occur in pPaediatric intensive care units (PICUs).[2–5] The planned withdrawal of life-sustaining measures (WLSM) in many of these deaths in the PICU represents a transition from an invasive, interventional approach to a comfort and family-oriented approach. WLSM can be defined as the process in which medical interventions (eg, vasopressors and mechanical ventilation) are discontinued, which ultimately result in the patient's death from the underlying disease and/or complications.[6] Intensivists play a key role in facilitating this transition and the dying process before, during and after WLSMs. However, the physiology of the dying process following WLSMs is not well described in children. A retrospective study proposed a machine learning model that can reasonably predict death within 1 hour of WLSM in children,[7] but this model remains unvalidated and is not feasible for many institutions at this time.

The uncertainty around the timing of death among children after WLSMs can have negative impacts on family members, healthcare professionals and organ donation processes. Family members of children going through WLSM frequently report feelings of vulnerability and uncertainty during the

death process and the unpredictability of death timing can exacerbate these feelings.[8] In addition, the unpredictability of death timing for children after WLSMs can impact clinicians' ability to provide excellent end-of-life care, to counsel families through this difficult process, and to identify the children who will die within an acceptable timeframe to allow for controlled donation after circulatory determination of death (DCD).[9] The practice of controlled DCD has been increasing in recent years, and in this procedure, donation can be performed after circulatory DCD following a 5 min no-touch period after the WLSM.[10]

Donation after circulatory DCD represents a significant and growing proportion of donation in adults. In paediatrics, this proportion has been reported to be as high as 32.2%[11]; but in Canada, it remains small, accounting for only 10% of donors in 2019.[12] Although most paediatric deaths occur in the PICU,[3 13] a 2019 survey showed that several Canadian PICUs did not offer DCD.[12] In addition, a recent study estimated an active paediatric DCD programme could increase potential donations by 20%.[14] Therefore, there are recurrent missed opportunities for donation for both donors and recipients in Canadian PICUs.

It is essential to evaluate the current knowledge of the dying process in children, including timing of death and the impact on families, healthcare workers and the organ donation process. A better understanding of the physiology of dying may improve time of death prediction, empower clinicians, improve counselling for families and increase donor identification.[9] Insight into the experiences of families and treating team members may also provide the means necessary to better tailor counselling and end of life management in the PICU.

After conducting a preliminary search on MEDLINE, the Cochrane Database of Systematic Reviews and Joanna Briggs Institute (JBI) Evidence Synthesis, we did not identify any reviews on time of death prediction nor on its potential impact on families, clinicians and the organ donation system. However, we identified a meta-synthesis[15] and a scoping review,[16] evaluating parental experience of the death of children in the PICU, but these did not review the specific question of physiology nor time of death prediction, nor did they explore the perspective of healthcare providers. Therefore, this scoping review will aim to collate and summarise the current literature about what is known regarding the dying process in children after the WLSM in PICU.

The overarching question of this scoping review is: What is known about the process of dying in children after WLSM in PICU settings worldwide? The subquestions are: (1) What evidence exists that explores the physiological process of dying after WLSM in children? (2) What tools are available to help predict the timing of death after WLSM in children? (3) What is the impact of time of death (or prediction) after WLSM in children on healthcare workers and the organ donation process? (4) What is the evidence on the process of dying after WLSM in children in the family's experience of death?

METHODS AND ANALYSIS

This protocol and the proposed scoping review follow the JBI methodology for scoping reviews.[17]

Eligibility criteria
Participants
This scoping review will consider references that include children (0–18 years of age) going through WLSM. However, if the study focuses on newborns in neonatal intensive care unit (NICU), the reference will be excluded as premature infants have physiology that is distinct from term babies and children and thus, we believe that studies focused in NICU should be studied separately. In addition, if the study report on mixed data (eg, adult and paediatric patients), the results for paediatric patients need to be reported separately for the reference to be considered for inclusion. Our goal is to complete our review during the period from May to October 2022.

Concept
The main concept of interest in this review is the process of dying in children after WLSM, including aspects such as the physiological process of dying and time to death prediction. In addition, if the reports focus on the impact of the dying process in children after WLSM on families, healthcare workers and organ donation processes, the report will also be included. However, if the reference only reviews the incidence of autoresuscitation or transient resumption of cardiac activity in children, or if it focuses only on paediatric donation after circulatory death then the report will be excluded as these are not exclusively related to WLSM, and therefore, go beyond the scope of this review; as well as these areas have recently been explored and reported in other literature reviews.[18 19]

Context
References will be considered if they are focused on any paediatric intensive care settings worldwide. If the research is based in the NICU setting then the reference will be excluded for the reasons explained above. In addition, WLSM in settings other than PICU (eg, renal services, oncology units and ambulatory settings) will not be considered for inclusion.

Types of Sources
This scoping review will consider both experimental and quasi-experimental study designs including randomised controlled trials, non-randomised controlled trials, before-and-after studies and interrupted time-series studies. In addition, analytical observational studies including prospective and retrospective cohort studies, case–control studies and analytical cross-sectional studies will be considered for inclusion. This review will also consider descriptive observational study designs including case series, individual case reports and descriptive cross-sectional studies for inclusion. Qualitative studies will also be considered that focus on qualitative data including, but not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description,

action research and feminist research. In addition, references from systematic reviews will be screened to ensure no relevant references were missed in our search strategy. Text and opinion papers will also be considered for inclusion in this scoping review. We will not exclude references based on date of publication, but only articles in English and French will be considered.

Search strategy

The search strategy aimed to locate both published and unpublished papers. An initial limited search of Medline (OVID) was completed by an experienced information specialist with an analysis of the text words in titles, abstracts and index terms used to describe articles. The search strategy included controlled vocabulary (eg, MeSH) and text words for concepts: death processes, time to death predictions after WLSM and paediatrics. The strategy was created using an interactive process based on findings from initial searching, as well as the final searching strategy was reviewed using the Peer Review of Electronic Search Strategies for systematic reviews by a second experienced information specialist in medical research.[20] In addition, the primary information specialist designed and adapted all search strategies (online supplemental appendix I) for the following electronic databases: Ovid MEDLINE, Ovid Embase, Cochrane Central Register of Controlled Trials (CENTRAL) via EBM Reviews Ovid, Ovid PsycINFO, CINAHL (EBSCOhost) and Web of Science databases (Science Citation Index Expanded; Social Sciences Citation Index). The information specialist also searched Embase for meeting abstracts from the past 3 years and Web of Science Conference Proceedings Citation Indices, ProQuest Dissertations & Theses Global, and Google Scholar for any studies missed by the database searches. The search results were limited to human studies in English or French. No publication date or document type restrictions were applied to the search.

Study/source of evidence selection

Following the search, all identified citations will be collated and uploaded into Covidence (web-based systematic review platform) and duplicates removed. Following a pilot test, titles and abstracts will be screened by two independent reviewers in a blinded review process for assessment against the inclusion criteria for the review. Potentially relevant sources will be assessed in detail using the full text by two independent reviewers for final decision regarding inclusion/exclusion. Any disagreements that arise between the reviewers at each stage of the selection process will be resolved through discussion or with the input of a third reviewer. Reasons for exclusion of sources of evidence at full text that do not meet the inclusion criteria will be recorded and reported in the final report of this scoping review. The results of the search and the study inclusion process will be reported in full in the final scoping review and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses

extension for scoping review flow diagram.[21] The reference list of selected articles will also be searched for additional sources of information according to the same inclusion criteria.

Data extraction

Data will be extracted from the included reports by two independent reviewers using a data extraction tool that we developed for this review (online supplemental appendix II). The data extraction tool will be pilot tested at the beginning of the data extraction process, modified and revised as needed during the process. Any disagreements between the reviewers during the data extraction will be solved through discussion or with the input of a third reviewer. The data extraction tool includes specific details about the population, concept, context, study methods and key findings relevant to the review objective (eg, physiological process of dying after WLSM, tools to predict death, family experience, impact on organ donation process). If needed, authors of papers will be contacted to request missing or additional data.

Data analysis and presentation

After the data extraction process, the data will be collated and summarised quantitatively and qualitatively to respond to the objective and research questions of this review. For the quantitative part, we will use a descriptive numerical summary, and for the qualitative part we will conduct a content analysis using an inductive approach from the data extracted. In the descriptive numerical summary, we will use a simple numerical count to describe the characteristics of the included reports (eg, year of publication, design, country), and data from the content analysis will be presented in categories using a narrative format to discuss the current state of the literature on the dying process in children after WLSM. We will also develop charts and tables to help clarify the findings from this scoping review related to the evidence exploring the physiological process of dying after WLSM in children, tools available to predict the timing of death and the impact of time of death on family members, healthcare workers and the organ donation process. Also, a quality appraisal of the included literature will not be conducted to be in line with JBI scoping review methodology.

operation of interprovincial organ sharing programmes. Canadian Blood Services is not responsible for the management or funding of any Canadian organ donation organisation or transplant programme. Canadian Blood Services works with the organ and tissue donation and transplantation community to improve the system for all Canadians.

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Appendix I: Search strategy

Database: Ovid MEDLINE(R) ALL 1946 to March 28, 2022

Date search conducted: March 29, 2022

Strategy:

1   ((death or dying or "end of life") and (process* or sign* or stage*)).ti. [coordinated concept for dying process] (5224)

2   Death/ and Blood Circulation/ (55)

3   Death/ and Heart Arrest/ (359)

4   *Death/ (12447)

5   asystol*.tw,kf. (4589)

6   ((arrest$1 or dead or death$1 or flat-lin* or flatlin*) adj2 (cardi* or circulat* or heart)).tw,kf. (102172)

7   ((cessation or failure) adj5 (cardiac rhythm$1 or circulat* or heart function*)).tw,kf. (5007)

8   ((cessation or terminat*) adj3 cardi* resuscitation).tw,kf. (45)

9   or/2-8 [cardiac arrest or circulatory death] (121401)

10   Hemodynamics/ (144986)

11   exp Vital Signs/ph [Physiology] (91422)

12   ((death or dying or "end of life") adj3 (patholog* or pathophysiolog* or physiolog* or physiopatholog* or process* or sign* or stage*)).tw,kf. (30949)

13   (h?emodynamic* or h?emo dynamic*).tw,kf. (193055)

14   vital sign*.tw,kf. (17684)

15   or/10-14 [physiological processes] (391130)

16   1 or (9 and 15) [Set 1: physiological processes of circulatory death] (15339)

17   exp Life Support Care/ (9040)

18   Resuscitation Orders/ (4105)

19   exp Withholding Treatment/ (16084)

20   Terminal Care/ (30611)

21   ((ceas* or cessation* or stop* or withdraw* or withhold*) adj2 (care or cardiorespiratory support* or life support* or life sustain* or life prolong* or resuscitat* or treat* or therap*)).tw,kf. (31647)

22   ((negative or passive) adj euthanasia*).tw,kf. (246)

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23   ((DNR or resuscitat*) adj3 (deci* or order* or polic*)).tw,kf. (3070)

24   or/17-23 [withdrawal of life sustaining measures] (82132)

25   Time Factors/ (1226714)

26   delay*.tw,kf. (529639)

27   day$1.tw,kf. (2173048)

28   "how long".tw,kf. (7650)

29   (hour$1 or hr$1).tw,kf. (928541)

30   (min$1 or minute$1).tw,kf. (1195001)

31   ((observ* or wait*) adj3 period$1).tw,kf. (49375)

32   seconds.tw,kf. (53765)

33   (time$1 or timing$1).tw,kf. (4176680)

34   or/25-33 [time factors] (7730658)

35   ((confirm* or criteri* or declar* or determin* or diagnos* or exam* or pronounc* or predict*) adj3 (dead or death$1 or die or died or dies or dying)).tw,kf. [death determination] (41430)

36   and/24,34-35 [Set 2: time to death predictions after withdrawal of life sustaining measures] (545)

37   *Attitude to Death/ (9625)

38   *Bereavement/ (4444)

39   *Communication/ (40752)

40   Family/px [Psychology] (23573)

41   Family Relations/ (11855)

42   Parent-Child Relations/ (35593)

43   exp Parents/px [Psychology] (55498)

44   Professional-Family Relations/ (15413)

45   Qualitative Research/ (72468)

46   ((attitude* or bereave* or communicat* or comfort* or experienc* or frustrat* or grief or griev* or role*) adj5 (care giver* or caregiver* or carer* or famil* or father* or mother* or parent* or relatives)).tw,kf. (102945)

47   or/37-46 [family experiences] (308199)

48   47 and (1 or 9 or 24) [Set 3: family experiences of death or withdrawal of life sustaining measures] (11904)

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49   Adolescent/ (2167149)

50   exp Child/ (2060838)

51   Child, Hospitalized/ (7124)

52   exp Infant/ (1212475)

53   Minors/ (2731)

54   exp Pediatrics/ (62254)

55   (adolescen* or boy* or girl* or minors or teen*).tw,kf. (572388)

56   (babies* or baby* or infan* or neo-nat* or neonat* or newborn* or post matur* or postmatur* or post nat* or postnat*).tw,kf. (931351)

57   (child* or kid or kids or preschool* or school age* or schoolchild* or toddler*).tw,kf. (1585527)

58   (elementary school* or grade school* or gradeschool* or high school* or highschool* or kindergar* or nursery school* or primary school* or secondary school*).tw,kf. (79676)

59   p?ediatric*.tw,kf. (423876)

60   or/49-59 [Set 4: children] (4658631)

61   Hospitals, Pediatric/ (14698)

62   exp Intensive Care Units, Pediatric/ (25613)

63   PICU*.tw,kf. (6583)

64   ((child* or p?ediatric*) adj3 (acute care or ICU* or intensive care or hospital* or trauma cent*)).tw,kf. (78346)

65   or/61-64 [Set 5: PICU] (103413)

66   16 and 60 [Q1: physiological process of dying in children] (1870)

67   36 and (60 or 65) [Q2-4: time prediction after withdrawal of life support in paediatrics] (142)

68   48 and 65 [Q5: family experience of death in the PICU] (447)

69   or/66-68 [Q1-5] (2427)

70   (exp animals/ or exp animal experimentation/ or exp models animal/ or exp vertebrates/) not (exp humans/ or exp human experimentation/) (4981215)

71   ((ape or apes or animal* or baboon* or beagle* or cat or cats or chicken or chickens or chimp* or dog or dogs or feline* or fish or hamster or hamsters or horse or horses or lamb* or lapin* or macaque* or mouse or mice or nonhuman* or non human* or pig or piglet* or pigs or porcine or rabbit or rabbit or raccoon or raccoons or racehorse or racehorses or rat or rats or rodent* or swine* or sheep or zebrafish*) not (adults or children or human or humans or infants or patient or patients or people or seniors)).ti,kf. (2263725)

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72   70 or 71 [animal filter] (5366924)

73   69 not 72 [exclude animal studies] (2202)

74   limit 73 to (english or french) (1990)

75   remove duplicates from 74 [MEDLINE results for export] (1990)

Database: Ovid Embase Classic+Embase 1947 to 2022 March 28

Date search conducted: March 29, 2022

Strategy:

1   ((death or dying or "end of life") and (process* or sign* or stage*)).ti. [coordinated concept for dying process] (6499)

2   dying/ (10432)

3   heart arrest/ (83317)

4   heart death/ (30479)

5   asystol*.tw,kw. (8084)

6   ((arrest$1 or dead or death$1 or flat-lin* or flatlin*) adj2 (cardi* or circulat* or heart)).tw,kw. (164630)

7   ((cessation or failure) adj5 (cardiac rhythm$1 or circulat* or heart function*)).tw,kw. (8689)

8   ((cessation or terminat*) adj3 cardi* resuscitation).tw,kw. (74)

9   or/2-8 [cardiac arrest or circulatory death] (225828)

10   cardiopulmonary hemodynamics/ (5170)

11   exp heart hemodynamics/ (205410)

12   hemodynamics/ (170128)

13   vital sign/ (28692)

14   ((death or dying or "end of life") adj3 (patholog* or pathophysiolog* or physiolog* or physiopatholog* or process* or sign* or stage*)).tw,kw. (43104)

15   (h?emodynamic* or h?emo dynamic*).tw,kw. (286143)

16   vital sign*.tw,kw. (35312)

17   or/10-16 [physiological processes] (602251)

18   1 or (9 and 17) [Set 1: physiological processes of circulatory death] (38453)

19   terminal care/ (39632)

20   treatment withdrawal/ (21895)

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21 ((ceas* or cessation* or stop* or withdraw* or withhold*) adj2 (care or cardiorespiratory support* or life support* or life sustain* or life prolong* or resuscitat* or treat* or therap*)).tw,kw. (54311)

22 ((negative or passive) adj euthanasia*).tw,kw. (309)

23 ((DNR or resuscitat*) adj3 (deci* or order* or polic*)).tw,kw. (4455)

24 or/19-23 [withdrawal of life sustaining measures] (113827)

25 time factor/ (44481)

26 delay*.tw,kw. (752656)

27 day$1.tw,kw. (3391617)

28 "how long".tw,kw. (11076)

29 (hour$1 or hr$1).tw,kw. (1626091)

30 (min$1 or minute$1).tw,kw. (1770414)

31 ((observ* or wait*) adj3 period$1).tw,kw. (78886)

32 seconds.tw,kw. (85525)

33 (time$1 or timing$1).tw,kw. (5812376)

34 or/25-33 [time factors] (10200116)

35 ((confirm* or criteri* or declar* or determin* or diagnos* or exam* or pronounc* or predict*) adj3 (dead or death$1 or die or died or dies or dying)).tw,kw. [death determination] (61960)

36 and/24,34-35 [Set 2: time to death predictions after withdrawal of life sustaining measures] (869)

37 *attitude to death/ (6557)

38 *bereavement/ (5079)

39 bereavement counseling/ (359)

40 bereavement support/ (645)

41 exp child parent relation/ (99525)

42 family relation/ (12412)

43 *interpersonal communication/ (52023)

44 professional-patient relationship/ (11619)

45 qualitative research/ (98362)

46 ((attitude* or bereave* or communicat* or comfort* or experienc* or frustrat* or grief or griev* or role*) adj5 (care giver* or caregiver* or carer* or famil* or father* or mother* or

parent* or relatives)).tw,kw. (132800)

47   or/37-46 [family experiences] (374958)

48   47 and (1 or 9 or 24) [Set 3: family experiences of death or withdrawal of life sustaining measures] (10613)

49   exp adolescent/ (1801403)

50   exp child/ (3278637)

51   child death/ (6935)

52   child hospitalized/ (5151)

53   exp infant/ (1243396)

54   "minor (person)"/ (803)

55   pediatrics/ (94168)

56   (adolescen* or boy* or girl* or minors or teen*).tw,kw. (783128)

57   (babies* or baby* or infan* or neo-nat* or neonat* or newborn* or post matur* or postmatur* or post nat* or postnat*).tw,kw. (1195137)

58   (child* or kid or kids or preschool* or school age* or schoolchild* or toddler*).tw,kw. (2142914)

59   (elementary school* or grade school* or gradeschool* or high school* or highschool* or kindergar* or nursery school* or primary school* or secondary school*).tw,kw. (102898)

60   p?ediatric*.tw,kw. (673409)

61   or/49-60 [Set 4: children] (5220469)

62   pediatric emergency medicine/ (1098)

63   pediatric hospital/ (28187)

64   pediatric intensive care unit/ (10296)

65   PICU*.tw,kw. (14309)

66   ((child* or p?ediatric*) adj3 (acute care or ICU* or intensive care or hospital* or trauma cent*)).tw,kw. (126884)

67   or/62-66 [Set 5: PICU] (142676)

68   18 and 61 [Q1: physiological process of dying in children] (3415)

69   36 and (61 or 67) [Q2-4: time prediction after withdrawal of life support in paediatrics] (189)

70   48 and 67 [Q5: family experience of death in the PICU] (295)

71   or/68-70 [Q1-5] (3860)

72   (exp animals/ or exp animal experimentation/ or exp models animal/ or exp vertebrates/) not (exp humans/ or exp human experimentation/) (6039722)

73   ((ape or apes or animal* or baboon* or beagle* or canine* or cat or cats or cattle or chicken or chickens or chimp* or dog or dogs or feline* or fish or hamster or hamsters or horse or horses or lamb* or lapin* or macaque* or mouse or mice or nonhuman* or non human* or pig or piglet* or pigs or porcine or rabbit or rabbit or raccoon or raccoons or racehorse or racehorses or rat or rats or rodent* or swine* or sheep or zebrafish*) not (adults or children or human or humans or infants or patient or patients or people or seniors)).ti. (2737195)

74   72 or 73 [animal filter] (6421112)

75   71 not 74 [exclude animal studies] (3473)

76   (Conference Abstract or Conference Paper or Conference Review).pt. (5135989)

77   75 and 76 (1094)

78   limit 77 to yr="2019-2022" (332)

79   75 not 76 [exclude conference proceedings] (2379)

80   79 or 78 [add proceedings from last 3 yrs] (2711)

81   limit 80 to (english or french) (2502)

82   limit 81 to embase (1924)

83   remove duplicates from 82 [Embase results for export] (1917)

Database: EBM Reviews - Cochrane Central Register of Controlled Trials January 2022

Date search conducted: March 29, 2022

Strategy:

1   ((death or dying or "end of life") and (process* or sign* or stage*)).ti. [coordinated concept for dying process] (72)

2   Death/ and Blood Circulation/ (0)

3   Death/ and Heart Arrest/ (11)

4   Death/ (222)

5   asystol*.tw. (331)

6   ((arrest$1 or dead or death$1 or flat-lin* or flatlin*) adj2 (cardi* or circulat* or heart)).tw. (15713)

7   ((cessation or failure) adj5 (cardiac rhythm$1 or circulat* or heart function*)).tw. (556)

8   ((cessation or terminat*) adj3 cardi* resuscitation).tw. (1)

9   or/2-8 [cardiac arrest or circulatory death] (16514)

10   Hemodynamics/ (10641)

11   exp Vital Signs/ (37981)

12   ((death or dying or "end of life") adj3 (patholog* or pathophysiolog* or physiolog* or physiopatholog* or process* or sign* or stage*)).tw. (750)

13   (h?emodynamic* or h?emo dynamic*).tw. (33593)

14   vital sign*.tw. (16304)

15   or/10-14 [physiological processes] (86388)

16   1 or (9 and 15) [Set 1: physiological processes of circulatory death] (1542)

17   exp Life Support Care/ (161)

18   Resuscitation Orders/ (36)

19   exp Withholding Treatment/ (398)

20   Terminal Care/ (373)

21   ((ceas* or cessation* or stop* or withdraw* or withhold*) adj2 (care or cardiorespiratory support* or life support* or life sustain* or life prolong* or resuscitat* or treat* or therap*)).tw. (12588)

22   ((negative or passive) adj euthanasia*).tw. (1)

23   ((DNR or resuscitat*) adj3 (deci* or order* or polic*)).tw. (234)

24   or/17-23 [withdrawal of life sustaining measures] (13588)

25   Time Factors/ (67119)

26   delay*.tw. (45437)

27   day$1.tw. (428499)

28   "how long".tw. (148088)

29   (hour$1 or hr$1).tw. (212983)

30   (min$1 or minute$1).tw. (130875)

31   ((observ* or wait*) adj3 period$1).tw. (11157)

32   seconds.tw. (14267)

33   (time$1 or timing$1).tw. (463566)

34   or/25-33 [time factors] (962959)

35   ((confirm* or criteri* or declar* or determin* or diagnos* or exam* or pronounc* or predict*) adj3 (dead or death$1 or die or died or dies or dying)).tw. [death determination] (3888)

36   and/24,34-35 [Set 2: time to death predictions after withdrawal of life sustaining measures]

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(53)

37   Attitude to Death/ (164)

38   Bereavement/ (136)

39   Communication/ (2503)

40   Family/px [Psychology] (0)

41   Family Relations/ (284)

42   Parent-Child Relations/ (1240)

43   exp Parents/px [Psychology] (4)

44   Professional-Family Relations/ (224)

45   Qualitative Research/ (1297)

46   ((attitude* or bereave* or communicat* or comfort* or experienc* or frustrat* or grief or griev* or role*) adj5 (care giver* or caregiver* or carer* or famil* or father* or mother* or parent* or relatives)).tw. (9300)

47   or/37-46 [family experiences] (13976)

48   47 and (1 or 9 or 24) [Set 3: family experiences of death or withdrawal of life sustaining measures] (254)

49   Adolescent/ (110345)

50   exp Child/ (59836)

51   Child, Hospitalized/ (143)

52   exp Infant/ (33634)

53   Minors/ (10)

54   exp Pediatrics/ (717)

55   (adolescen* or boy* or girl* or minors or teen*).tw. (41566)

56   (babies* or baby* or infan* or neo-nat* or neonat* or newborn* or post matur* or postmatur* or post nat* or postnat*).tw. (66374)

57   (child* or kid or kids or preschool* or school age* or schoolchild* or toddler*).tw. (146965)

58   (elementary school* or grade school* or gradeschool* or high school* or highschool* or kindergar* or nursery school* or primary school* or secondary school*).tw. (10198)

59   p?ediatric*.tw. (38493)

60   or/49-59 [Set 4: children] (316440)

61   Hospitals, Pediatric/ (214)

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62   exp Intensive Care Units, Pediatric/ (1123)

63   PICU*.tw. (1063)

64   ((child* or p?ediatric*) adj3 (acute care or ICU* or intensive care or hospital* or trauma cent*)).tw. (8664)

65   or/61-64 [Set 5: PICU] (9963)

66   16 and 60 [Q1: physiological process of dying in children] (142)

67   36 and (60 or 65) [Q2-4: time prediction after withdrawal of life support in paediatrics] (6)

68   48 and 65 [Q5: family experience of death in the PICU] (8)

69   or/66-68 [Q1-5] (155)

70   (exp animals/ or exp animal experimentation/ or exp models animal/ or exp vertebrates/) not (exp humans/ or exp human experimentation/) (17)

71   ((ape or apes or animal* or baboon* or beagle* or cat or cats or chicken or chickens or chimp* or dog or dogs or feline* or fish or hamster or hamsters or horse or horses or lamb* or lapin* or macaque* or mouse or mice or nonhuman* or non human* or pig or piglet* or pigs or porcine or rabbit or rabbit or raccoon or raccoons or racehorse or racehorses or rat or rats or rodent* or swine* or sheep or zebrafish*) not (adults or children or human or humans or infants or patient or patients or people or seniors)).ti. (5570)

72   70 or 71 [animal filter] (5587)

73   69 not 72 [exclude animal studies] (152)

74   remove duplicates from 73 [CENTRAL records for export] (152)

Database: Ovid APA PsycInfo 1806 to March Week 3 2022

Date search conducted: Mar 29, 2022

Strategy:

1   ((death or dying or "end of life") and (process* or sign* or stage*)).ti. [coordinated concept for dying process] (555)

2   "Death and Dying"/ (34646)

3   asystol*.ti,ab. (121)

4   ((arrest$1 or dead or death$1 or flat-lin* or flatlin*) adj2 (cardi* or circulat* or heart)).ti,ab. (2254)

5   ((cessation or failure) adj5 (cardiac rhythm$1 or circulat* or heart function*)).ti,ab. (79)

6   ((cessation or terminat*) adj3 cardi* resuscitation).ti,ab. (1)

7   or/2-6 [cardiac arrest or circulatory death] (36541)

8   Physiological Processes/ (182)

9   ((death or dying or "end of life") adj3 (patholog* or pathophysiolog* or physiolog* or physiopatholog* or process* or sign* or stage*)).ti,ab. (3753)

10   (h?emodynamic* or h?emo dynamic*).ti,ab. (5020)

11   vital sign*.ti,ab. (1831)

12   or/8-11 [physiological processes] (10758)

13   1 or (7 and 12) [Set 1: physiological processes of circulatory death] (1886)

14   Palliative Care/ (13574)

15   Treatment Withholding/ (918)

16   ((ceas* or cessation* or stop* or withdraw* or withhold*) adj2 (care or cardiorespiratory support* or life support* or life sustain* or life prolong* or resuscitat* or treat* or therap*)).ti,ab. (5602)

17   ((negative or passive) adj euthanasia*).ti,ab. (63)

18   ((DNR or resuscitat*) adj3 (deci* or order* or polic*)).ti,ab. (477)

19   or/14-18 [withdrawal of life sustaining measures] (19872)

20   Time/ (14139)

21   delay*.ti,ab. (88445)

22   day$1.ti,ab. (250658)

23   "how long".ti,ab. (2669)

24   (hour$1 or hr$1).ti,ab. (115093)

25   (min$1 or minute$1).ti,ab. (190889)

26   ((observ* or wait*) adj3 period$1).ti,ab. (5766)

27   seconds.ti,ab. (6099)

28   (time$1 or timing$1).ti,ab. (754635)

29   or/20-28 [time factors] (1176841)

30   ((confirm* or criteri* or declar* or determin* or diagnos* or exam* or pronounc* or predict*) adj3 (dead or death$1 or die or died or dies or dying)).ti,ab. [death determination] (4320)

31   and/19,29-30 [Set 2: time to death predictions after withdrawal of life sustaining measures] (112)

32   exp Bereavement/ (15942)

33   Communication/ (31134)

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34 Death Attitudes/ (3579)

35 Family Relations/ (37410)

36 exp Interpersonal Communication/ (87323)

37 Interpersonal Relationships/ (21475)

38 exp Parent Child Relations/ (72184)

39 exp Qualitative Methods/ (18833)

40 ((attitude* or bereave* or communicat* or comfort* or experienc* or frustrat* or grief or griev* or role*) adj5 (care giver* or caregiver* or carer* or famil* or father* or mother* or parent* or relatives)).ti,ab. (112125)

41 or/32-40 [family experiences] (343667)

42 41 and (1 or 7 or 19) [Set 3: family experiences of death or withdrawal of life sustaining measures] (10913)

43 exp Adolescent Development/ (61865)

44 Child Death/ (357)

45 Child Health/ (525)

46 exp Childhood Development/ (116182)

47 Early Adolescence/ (2522)

48 Early Childhood Development/ (15009)

49 Infant Development/ (21210)

50 Neonatal Period/ (1858)

51 Pediatrics/ (28441)

52 Puberty/ (3054)

53 (adolescen* or boy* or girl* or minors or teen*).ti,ab. (345092)

54 (babies* or baby* or infan* or neo-nat* or neonat* or newborn* or post matur* or postmatur* or post nat* or postnat*).ti,ab. (140094)

55 (child* or kid or kids or preschool* or school age* or schoolchild* or toddler*).ti,ab. (746998)

56 (elementary school* or grade school* or gradeschool* or high school* or highschool* or kindergar* or nursery school* or primary school* or secondary school*).ti,ab. (155980)

57 p?ediatric*.ti,ab. (40170)

58 or/43-57 [Set 4: children] (1111590)

59 PICU*.ti,ab. (483)

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60   ((child* or p?ediatric*) adj3 (acute care or ICU* or intensive care or hospital* or trauma cent*)).ti,ab. (7827)

61   59 or 60 [Set 5: PICU] (8077)

62   13 and 58 [Q1: physiological process of dying in children] (321)

63   31 and (58 or 61) [Q2-4: time prediction after withdrawal of life support in paediatrics] (16)

64   41 and 61 [Q5: family experience of death in the PICU] (1441)

65   or/62-64 [Q1-5] (1774)

66   (exp animals/ or exp animal experimentation/ or exp animal experiment/ or exp models animal/ or nonhuman/ or exp vertebrate/ or exp vertebrates/ or animal.po.) not (exp humans/ or exp human experimentation/ or exp human experiment/ or human.po.) (379922)

67   ((ape or apes or animal* or baboon* or beagle* or cat or cats or chicken or chickens or chimp* or dog or dogs or feline* or fish or hamster or hamsters or horse or horses or lamb* or lapin* or macaque* or mouse or mice or nonhuman* or non human* or pig or piglet* or pigs or porcine or rabbit or rabbit or raccoon or raccoons or racehorse or racehorses or rat or rats or rodent* or swine* or sheep or zebrafish*) not (adults or children or human or humans or infants or patient or patients or people or seniors)).ti. (171211)

68   66 or 67 [animal filter] (398941)

69   65 not 68 [exclude animal studies] (1746)

70   limit 69 to (english or french) (1630)

71   remove duplicates from 70 [PsycINFO results for export] (1629)

Database: CINAHL via EBSCOhost

Date search conducted: March 29, 2022

#	Query	Limiters/Expanders	Results
S1	TI ((death or dying or "end of life") and (process* or sign* or stage*))	Search modes - Boolean/Phrase	1,119
S2	(MM "Death")	Search modes - Boolean/Phrase	9,829
S3	(MH "Death") and (MH "Blood Circulation")	Search modes - Boolean/Phrase	37

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S4	(MH "Death") and (MH "Heart Arrest")	Search modes - Boolean/Phrase	205
S5	(MH "Death, Sudden, Cardiac")	Search modes - Boolean/Phrase	7,121
S6	TI asystol* or AB asystol*	Search modes - Boolean/Phrase	1,222
S7	TI ((arrest* or dead or death* or "flat lin*" or flatlin*) N2 (cardi* or circulat* or heart)) or AB ((arrest* or dead or death* or "flat lin*" or flatlin*) N2 (cardi* or circulat* or heart))	Search modes - Boolean/Phrase	36,787
S8	TI ((cessation or terminat*) N3 "cardi* resuscitation") or AB ((cessation or terminat*) N3 "cardi* resuscitation")	Search modes - Boolean/Phrase	19
S9	S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8	Search modes - Boolean/Phrase	50,347
S10	(MH "Hemodynamics")	Search modes - Boolean/Phrase	20,326
S11	(MH "Vital Signs+")	Search modes - Boolean/Phrase	19,554
S12	TI ((death or dying or "end of life") N3 (patholog* or pathophysiolog* or physiolog* or physiopatholog* or process* or sign* or stage*)) or AB ((death or dying or "end of life") N3 (patholog* or pathophysiolog* or physiolog* or physiopatholog* or process* or sign* or stage*))	Search modes - Boolean/Phrase	9,280
S13	TI (h#emodynamic* or "h#emo dynamic*") or AB (h#emodynamic* or "h#emo dynamic*")	Search modes - Boolean/Phrase	31,043
S14	TI "vital sign*" or AB "vital sign*"	Search modes - Boolean/Phrase	8,165
S15	S10 OR S11 OR S12 OR S13 OR S14	Search modes - Boolean/Phrase	74,200

S16	S1 OR (S9 AND S15)	Search modes - Boolean/Phrase	4,275
S17	(MH "Euthanasia, Passive")	Search modes - Boolean/Phrase	4,927
S18	(MH "Life Support Care+")	Search modes - Boolean/Phrase	4,592
S19	(MH "Resuscitation Orders")	Search modes - Boolean/Phrase	3,208
S20	(MH "Terminal Care")	Search modes - Boolean/Phrase	19,220
S21	TI ((ceas* or cessation* or stop* or withdraw* or withhold*) N2 (care or "cardiorespiratory support*" or "life support*" or "life sustain*" or "life prolong*" or resuscitat* or treat* or therap*)) or AB ((ceas* or cessation* or stop* or withdraw* or withhold*) N2 (care or "cardiorespiratory support*" or "life support*" or "life sustain*" or "life prolong*" or resuscitat* or treat* or therap*))	Search modes - Boolean/Phrase	11,096
S22	TI ((negative or passive) N1 euthanasia*) or AB ((negative or passive) N1 euthanasia*)	Search modes - Boolean/Phrase	80
S23	TI ((DNR or resuscitat*) N3 (deci* or order* or polic*)) or AB ((DNR or resuscitat*) N3 (deci* or order* or polic*))	Search modes - Boolean/Phrase	2,009
S24	S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23	Search modes - Boolean/Phrase	39,238
S25	(MH "Time Factors")	Search modes - Boolean/Phrase	181,711
S26	TI delay* or AB delay*	Search modes - Boolean/Phrase	98,006
S27	TI (day or days) or AB (day or days)	Search modes - Boolean/Phrase	359,213

S28	TI "how long" or AB "how long"	Search modes - Boolean/Phrase	2,489
S29	TI (hour or hours or hr or hrs) or AB (hour or hours or hr or hrs)	Search modes - Boolean/Phrase	172,554
S30	TI (min or mins or minute or minutes) or AB (min or mins or minute or minutes)	Search modes - Boolean/Phrase	136,029
S31	TI ((observ* or wait*) N3 period*) or AB ((observ* or wait*) N3 period*)	Search modes - Boolean/Phrase	10,329
S32	TI seconds or AB seconds	Search modes - Boolean/Phrase	191,016
S33	TI (time or timed or times or timing or timings) or AB (time or timed or times or timing or timings)	Search modes - Boolean/Phrase	768,052
S34	S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33	Search modes - Boolean/Phrase	1,428,586
S35	TI ((confirm* or criteri* or declar* or determin* or diagnos* or exam* or pronounc* or predict*) N3 (dead or death$1 or die or died or dies or dying)) or AB ((confirm* or criteri* or declar* or determin* or diagnos* or exam* or pronounc* or predict*) N3 (dead or death$1 or die or died or dies or dying))	Search modes - Boolean/Phrase	2,295
S36	S24 AND S34 AND S35	Search modes - Boolean/Phrase	90
S37	(MM "Attitude to Death")	Search modes - Boolean/Phrase	5,177
S38	(MM "Bereavement")	Search modes - Boolean/Phrase	5,374
S39	(MM "Communication")	Search modes - Boolean/Phrase	34,407

S40	(MH "Family/PF")	Search modes - Boolean/Phrase	12,219
S41	(MH "Family Relations")	Search modes - Boolean/Phrase	17,734
S42	(MM "Grief")	Search modes - Boolean/Phrase	4,494
S43	(MH "Parent-Child Relations+")	Search modes - Boolean/Phrase	37,633
S44	(MH "Parents+/PF")	Search modes - Boolean/Phrase	32,353
S45	(MH "Professional-Family Relations")	Search modes - Boolean/Phrase	17,509
S46	(MH "Qualitative Studies+")	Search modes - Boolean/Phrase	167,342
S47	TI ((attitude* or bereave* or communicat* or comfort* or experienc* or frustrat* or grief or griev* or role*) N5 ("care giver*" or caregiver* or carer* or famil* or father* or mother* or parent* or relatives)) or AB ((attitude* or bereave* or communicat* or comfort* or experienc* or frustrat* or grief or griev* or role*) N5 ("care giver*" or caregiver* or carer* or famil* or father* or mother* or parent* or relatives))	Search modes - Boolean/Phrase	73,344
S48	S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47	Search modes - Boolean/Phrase	330,435
S49	S48 AND (S1 OR S9 OR S24)	Search modes - Boolean/Phrase	9,989
S50	(MH "Adolescence+")	Search modes - Boolean/Phrase	573,274
S51	(MH "Child+")	Search modes - Boolean/Phrase	719,607

S52	(MH "Infant")	Search modes - Boolean/Phrase	183,272
S53	(MH "Infant, Hospitalized")	Search modes - Boolean/Phrase	686
S54	(MH "Infant, Newborn")	Search modes - Boolean/Phrase	139,956
S55	(MH "Minors (Legal)")	Search modes - Boolean/Phrase	768
S56	(MH "Pediatrics")	Search modes - Boolean/Phrase	21,132
S57	TI (adolescen* or boy* or girl* or minors or teen*) or AB (adolescen* or boy* or girl* or minors or teen*)	Search modes - Boolean/Phrase	252,581
S58	TI (babies* or baby* or infan* or "neo nat*" or neonat* or newborn* or "post matur*" or postmatur* or "post nat*" or postnat*) or AB (babies* or baby* or infan* or "neo nat*" or neonat* or newborn* or "post matur*" or postmatur* or "post nat*" or postnat*)	Search modes - Boolean/Phrase	221,846
S59	TI (child* or kid or kids or preschool* or "school age*" or schoolchild* or toddler*) or AB (child* or kid or kids or preschool* or "school age*" or schoolchild* or toddler*)	Search modes - Boolean/Phrase	558,901
S60	TI ("elementary school*" or "grade school*" or gradeschool* or "high school*" or highschool* or kindergar* or "nursery school*" or "primary school*" or "secondary school*") or AB ("elementary school*" or "grade school*" or gradeschool* or "high school*" or highschool* or kindergar* or "nursery school*" or "primary school*" or "secondary school*")	Search modes - Boolean/Phrase	40,984
S61	TI p#ediatric* or AB p#ediatric*	Search modes - Boolean/Phrase	157,980

S62	S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61	Search modes - Boolean/Phrase	1,384,448
S63	(MH "Hospitals, Pediatric")	Search modes - Boolean/Phrase	10,400
S64	(MH "Intensive Care Units, Pediatric")	Search modes - Boolean/Phrase	6,705
S65	TI ((child* or p#ediatric*) N3 ("acute care" or ICU* or "intensive care" or hospital* or "trauma cent*")) or AB ((child* or p#ediatric*) N3 ("acute care" or ICU* or "intensive care" or hospital* or "trauma cent*"))	Search modes - Boolean/Phrase	34,909
S66	TI PICU* or AB PICU*	Search modes - Boolean/Phrase	3,731
S67	S63 OR S64 OR S65 OR S66	Search modes - Boolean/Phrase	42,930
S68	S16 AND S62	Search modes - Boolean/Phrase	616
S69	S36 AND (S62 OR S67)	Search modes - Boolean/Phrase	16
S70	S49 AND S67	Search modes - Boolean/Phrase	298
S71	S68 OR S69 OR S70	Search modes - Boolean/Phrase	911
S72	((MH "Vertebrates+") NOT MH Human)	Search modes - Boolean/Phrase	209,754
S73	TI ((ape or apes or animal* or baboon* or beagle* or cat or cats or chicken or chickens or chimp* or dog or dogs or feline* or fish or hamster or hamsters or horse or horses or lamb* or lapin* or macaque* or mouse or mice or nonhuman* or "non human*" or pig or piglet* or pigs or porcine or rabbit or rabbit or raccoon	Search modes - Boolean/Phrase	109,385

or raccoons or racehorse or racehorses or rat or rats or rodent* or swine* or sheep or zebrafish*) not (adults or children or human or humans or infants or patient or patients or people or seniors))

S74	S72 OR S73	Search modes - Boolean/Phrase	242,356
S75	S71 NOT S74	Search modes - Boolean/Phrase	869
S76	S71 NOT S74	Limiters - Language: English, French Search modes - Boolean/Phrase	832

Database: Web of Science Core Collection: Science Citation Index Expanded (SCI-EXPANDED) --1900-present; Social Sciences Citation Index (SSCI) --1900-present; Conference Proceedings Citation Index - Science (CPCI-S) --1990-present; Conference Proceedings Citation Index - Social Sciences & Humanities (CPCI-SSH) --1990-present

Date search conducted: March 29, 2022

Strategy:

1. TI=((death or dying or "end of life") and (process* or sign* or stage*)) | Exact search 12,948

2. TS=(asystol* or ((arrest* or dead or death or deaths or "flat lin*" or flatlin*) NEAR/2 (cardi* or circulat* or heart)) or ((cessation or failure) NEAR/5 ("cardiac rhythm*" or circulat* or "heart function*")) or ((cessation or terminat*) NEAR/3 "cardi* resuscitation")) | Exact search 126,096

3. TS=(((death or dying or "end of life") NEAR/3 (patholog* or pathophysiolog* or physiolog* or physiopatholog* or process* or sign* or stage*)) or haemodynamic* or "haemo dynamic*" or hemodynamic or "hemo dynamic" or "vital sign*") | Exact search 217,897

4. #1 or (#2 and #3) | Exact search 20,316

5. TS=(((ceas* or cessation* or stop* or withdraw* or withhold*) NEAR/2 (care or "cardiorespiratory support*" or "life support*" or "life sustain*" or "life prolong*" or resuscitat* or treat* or therap*)) or ((negative or passive) NEAR/1 euthanasia*) or ((DNR or resuscitat*) NEAR/3 (deci* or order* or polic*))) | Exact search 38,361

6. TS=(delay* or day or days or "how long" or hour or hours or hr or hrs or min or mins or minute or minutes or ((observ* or wait*) NEAR/3 period*) or seconds or time or timed or times or timing or timings) | Exact search 12,924,160

7. TS=(((confirm* or criteri* or declar* or determin* or diagnos* or exam* or pronounc* or

predict*) NEAR/3 (dead or death or deaths or die or died or dies or dying))) | Exact search 60,467

8. #5 and #6 and #7 | Exact search 279

9. TS=(((attitude* or bereave* or communicat* or comfort* or experienc* or frustrat* or grief or griev* or role*) NEAR/5 ("care giver*" or caregiver* or carer* or famil* or father* or mother* or parent* or relatives))) | Exact search 155,162

10. #9 and (#1 OR #5 OR #7) | Exact search 993

11. TS=(adolescen* or babies* or baby* or boy* or child* or "elementary school*" or girl* or "grade school*" or gradeshool* or "high school*" or highschool* or infan* or kid or kids or kindergar* or minors or "neo nat*" or neonat* or newborn* or "nursery school*" or "primary school*" or "post matur*" or postmatur* or "post nat*" or postnat* or paediatric* or pediatric* or preschool* or "school age*" or schoolchild* or "secondary school*" or teen* or toddler*) | Exact search 3,559,807

12. TS=(((child* or paediatric* or pediatric*) NEAR/3 ("acute care" or ICU* or "intensive care" or hospital* or "trauma cent*")) or PICU*) | Exact search 73,464

13. #4 AND #11 | Exact search 1196

14. #8 AND (#11 OR #12) | Exact search 68

15. #10 AND #12 | Exact search 49

16. #13 OR #14 OR #15 | Exact search 1301

17. TI=((ape or apes or animal* or baboon* or beagle* or canine* or cat or cats or cattle or chicken or chickens or chimp* or dog or dogs or feline* or fish or hamster or hamsters or horse or horses or lamb* or lapin* or macaque* or mouse or mice or nonhuman* or "non human*" or pig or piglet* or pigs or porcine or rabbit or rabbit or raccoon or raccoons or racehorse or racehorses or rat or rats or rodent* or swine* or sheep or zebrafish*) not (adults or children or human or humans or infants or patient or patients or people or seniors)) | Exact search 3137520

18. #16 NOT #17 | Exact search 1182

19. #16 NOT #17 AND (LA==("ENGLISH" OR "FRENCH")) | Exact search 1139

Database: ProQuest Dissertations & Theses Global

Date search conducted: March 30, 2022

Strategy:

Search #1 (Q1)

Anywhere except full text (noft): (adolescen* or babies* or baby* or boy* or child* or "elementary school*" or girl* or "grade school*" or gradeshool* or "high school*" or highschool* or infan* or kid or kids or kindergar* or minors or "neo nat*" or neonat* or newborn* or "nursery school*" or "primary school*" or "post matur*" or postmatur* or "post

nat*" or postnat* or paediatric* or pediatric* or preschool* or "school age*" or schoolchild* or "secondary school*" or teen* or toddler*)

AND

Title: ((death OR dying OR "end of life") AND (process* OR sign OR signs OR stage*))

NOT

Title:((ape OR apes OR animal* OR baboon* OR beagle* OR canine* OR cat OR cats OR cattle OR chicken OR chickens OR chimp* OR dog OR dogs OR feline* OR fish OR hamster OR hamsters OR horse OR horses OR lamb* OR lapin* OR macaque* OR mouse OR mice OR nonhuman* OR "non human*" OR pig OR piglet* OR pigs OR porcine OR rabbit OR rabbit OR raccoon OR raccoons OR racehorse OR racehorses OR rat OR rats OR rodent* OR swine* OR sheep OR zebrafish*) NOT (adults OR children OR human OR humans OR infants OR patient OR patients OR people OR seniors))

Additional limits - English, French (35)

Search #2 (Q1)

Anywhere except full text (noft): (asystol* or ((arrest* or dead or death or deaths or "flat lin*" or flatlin*) NEAR/2 (cardi* or circulat* or heart)) or ((cessation or failure) NEAR/5 ("cardiac rhythm*" or circulat* or "heart function*")) or ((cessation or terminat*) NEAR/3 "cardi* resuscitation"))

AND

Anywhere except full text (noft): (((death or dying or "end of life") NEAR/3 (patholog* or pathophysiolog* or physiolog* or physiopatholog* or process* or sign or signs or stage*)) or haemodynamic* or "haemo dynamic*" or hemodynamic or "hemo dynamic" or "vital sign*")

AND

Anywhere except full text (noft): (adolescen* or babies* or baby* or boy* or child* or "elementary school*" or girl* or "grade school*" or gradeshool* or "high school*" or highschool* or infan* or kid or kids or kindergar* or minors or "neo nat*" or neonat* or newborn* or "nursery school*" or "primary school*" or "post matur*" or postmatur* or "post nat*" or postnat* or paediatric* or pediatric* or preschool* or "school age*" or schoolchild* or "secondary school*" or teen* or toddler*)

NOT

Title:((ape OR apes OR animal* OR baboon* OR beagle* OR canine* OR cat OR cats OR cattle OR chicken OR chickens OR chimp* OR dog OR dogs OR feline* OR fish OR hamster OR hamsters OR horse OR horses OR lamb* OR lapin* OR macaque* OR mouse OR mice OR nonhuman* OR "non human*" OR pig OR piglet* OR pigs OR porcine OR rabbit OR rabbit OR raccoon OR raccoons OR racehorse OR racehorses OR rat OR rats OR rodent* OR swine* OR sheep OR zebrafish*) NOT (adults OR children OR human OR humans OR infants OR patient OR patients OR people OR seniors))

Additional limits - English, French (14)

Search #3 (Q2-4)

Anywhere except full text (noft): (((ceas* or cessation* or stop* or withdraw* or withhold*) NEAR/2 (care or "cardiorespiratory support*" or "life support*" or "life sustain*" or "life prolong*" or resuscitat* or treat* or therap*)) or ((negative or passive) NEAR/1 euthanasia*) or ((DNR or resuscitat*) NEAR/3 (deci* or order* or polic*)))

AND

Anywhere except full text (noft): ((confirm* or criteri* or declar* or determin* or diagnos* or exam* or pronounc* or predict*) AND (dead or death or deaths or die or died or dies or dying))

AND

Anywhere except full text (noft): (adolescen* or babies* or baby* or boy* or child* or "elementary school*" or girl* or "grade school*" or gradeshool* or "high school*" or highschool* or infan* or kid or kids or kindergar* or minors or "neo nat*" or neonat* or newborn* or "nursery school*" or "primary school*" or "post matur*" or postmatur* or "post nat*" or postnat* or paediatric* or pediatric* or preschool* or "school age*" or schoolchild* or "secondary school*" or teen* or toddler*)

NOT

Title:((ape OR apes OR animal* OR baboon* OR beagle* OR canine* OR cat OR cats OR cattle OR chicken OR chickens OR chimp* OR dog OR dogs OR feline* OR fish OR hamster OR hamsters OR horse OR horses OR lamb* OR lapin* OR macaque* OR mouse OR mice OR nonhuman* OR "non human*" OR pig OR piglet* OR pigs OR porcine OR rabbit OR rabbit OR raccoon OR raccoons OR racehorse OR racehorses OR rat OR rats OR rodent* OR swine* OR sheep OR zebrafish*) NOT (adults OR children OR human OR humans OR infants OR patient OR patients OR people OR seniors))

Additional limits - English, French (31)

Search #4 (Q5)

Anywhere except full text (noft): ((attitude* or bereave* or communicat* or comfort* or experienc* or frustrat* or grief or griev* or role*) AND ("care giver*" or caregiver* or carer* or famil* or father* or mother* or parent* or relatives))

AND

Anywhere except full text (noft): (((ceas* or cessation* or stop* or withdraw* or withhold*) NEAR/2 (care or "cardiorespiratory support*" or "life support*" or "life sustain*" or "life prolong*" or resuscitat* or treat* or therap*)) or ((negative or passive) NEAR/1 euthanasia*) or ((DNR or resuscitat*) NEAR/3 (deci* or order* or polic*)))

AND

Anywhere except full text (noft): (((child* or paediatric* or pediatric*) AND ("acute care" or ICU* or "intensive care" or hospital* or "trauma cent*")) or PICU*)

NOT

Title:((ape OR apes OR animal* OR baboon* OR beagle* OR canine* OR cat OR cats OR cattle OR chicken OR chickens OR chimp* OR dog OR dogs OR feline* OR fish OR hamster OR hamsters OR horse OR horses OR lamb* OR lapin* OR macaque* OR mouse OR mice OR nonhuman* OR "non human*" OR pig OR piglet* OR pigs OR porcine OR rabbit OR rabbit OR raccoon OR raccoons OR racehorse OR racehorses OR rat OR rats OR rodent* OR swine* OR sheep OR zebrafish*) NOT (adults OR children OR human OR humans OR infants OR patient OR patients OR people OR seniors))

Additional limits - English, French (13)

Search #5 (Q5)

Anywhere except full text (noft): ((attitude* or bereave* or communicat* or comfort* or experienc* or frustrat* or grief or griev* or role*) NEAR/5 ("care giver*" or caregiver* or carer* or famil* or father* or mother* or parent* or relatives))

AND

Anywhere except full text (noft): ((confirm* or criteri* or declar* or determin* or diagnos* or exam* or pronounc* or predict*) AND (dead or death or deaths or die or died or dies or dying))

AND

Anywhere except full text (noft): (((child* or paediatric* or pediatric*) AND ("acute care" or ICU* or "intensive care" or hospital* or "trauma cent*")) or PICU*)

NOT

Title:((ape OR apes OR animal* OR baboon* OR beagle* OR canine* OR cat OR cats OR cattle OR chicken OR chickens OR chimp* OR dog OR dogs OR feline* OR fish OR hamster OR hamsters OR horse OR horses OR lamb* OR lapin* OR macaque* OR mouse OR mice OR nonhuman* OR "non human*" OR pig OR piglet* OR pigs OR porcine OR rabbit OR rabbit OR raccoon OR raccoons OR racehorse OR racehorses OR rat OR rats OR rodent* OR swine* OR sheep OR zebrafish*) NOT (adults OR children OR human OR humans OR infants OR patient OR patients OR people OR seniors))

Additional limits - English, French (81)

Unique results (all searches): 165

Source: Google Scholar

Date search conducted: March 30-31, 2022

Strategy:

Search #1 (Q1)

(("cardiac arrest" | death | dying | "end of life") (hemodynamics | pathophysiology | physiology | physiopathology | process | sign | stage | "vital signs")) (adolescent or child or infant or pediatric)

Searched the first 10 pages of results (n=200 records), Kept 30

Search #2 (Q2-4)

(withdrawal of life support | withdrawal of life sustaining measures) (minute | hours | "how long" | seconds | time | "waiting period") (confirm | declare | determine | pronounce | predict) (death) (adolescent or child or infant or pediatric)

Searched the first 5 pages of results (n=100 records), Kept 38

Search #3 (Q5)

(experience | communication | grief | role) (family | parents) (death | withdrawal of life support | withdrawal of life sustaining measures) (pediatric critical care | pediatric intensive care unit | PICU)

Searched the first 5 pages of results (n=100 records), Kept 39

Appendix II: Data extraction instrument

Evidence Source Characteristics	
Authors	
Year	
Title of the report	
Type of publication (e.g., manuscript, webpage)	
Local of publication (e.g., website, journal, and if available, volume, issue, page and DOI)	
Methods	
Design adopted (e.g., cross-sectional survey)	
Country of publication	
Sample / Population (if applicable)	
Procedures (e.g., interviews, tools, institutional indicators, data analysis)	
Study Data	
Aim/Purpose	
Aspects mentioned about physiologic process of dying after WLSM	
Tools for prediction of death timing after WLSM (*if available, include details such as*: was the tool validated? what are the aspects of death used for prediction?)	
The impact of death timing after WLSM on family members (*if available, include details such as*: end-of-life experiences of family members, planning for ceremonials, etc.)	
The impact of death timing after WLSM on healthcare workers (*if available, include details such as*: impact in their daily activities, emotional impact, etc.)	
The impact of death timing after WLSM on the organ donation process (*if available, include details such as*: challenges in the process and overall outcomes from donation, etc.)	
Study/Report limitations stated by the author(s)	
Author's overall suggestion for future studies	
Other notes	