



Donor audits in deceased organ donation: a scoping review

Vérifications des donneurs et donneuses dans le don d'organes après le décès : une étude de portée

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Abstract

Purpose We sought to collate and summarize existing literature on donor audits (DA) and how they have been used to guide deceased organ donation and transplantation system performance and quality assurance.

Source We searched MEDLINE, Cumulative Index of Nursing and Allied Health Literature, and Web of Science supplemented by Google to identify grey literature on 6 May 2022, to locate studies in English, French, and Spanish. The data were screened, extracted, and analyzed independently by two reviewers. We grouped the results into five categories: 1) motivation for DA, 2) DA methodology, 3) potential and actual donors, 4) missed donation opportunities, and 5) quality improvement.

Principal findings The search yielded 2,416 unique publications and 52 were included in this review. Most studies were from the UK ($n = 13$) and published between 2001 and 2006 ($n = 15$). The methodologies described for DA were diverse. Our findings showed that the primary motivation for conducting DA was to identify potential donors and the number of potential deceased organ donors is significantly higher than the number of actual donors. Among retrieved studies, the proportion of donation opportunities following neurologic determination of death was 95/222 (43%) compared with 25/181 (14%) for donation after cardiocirculatory death (DCD), suggesting that the missed donation rate is higher for DCD.

Conclusion Donor audits help identify missed donation opportunities along the deceased donation pathway and can help support the evaluation of quality improvement initiatives.

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Résumé

Objectif Nous avons cherché à colliger et résumer la documentation existante sur les vérifications des donneuses et donneurs (VD) et la façon dont elles ont été utilisées pour guider la performance et l'assurance de la qualité des systèmes de don et de transplantation d'organes de personnes décédées.

Sources Le 6 mai 2022, nous avons effectué des recherches dans MEDLINE, CINAHL et Web of Science, complétées par des recherches sur Google afin d'identifier la littérature grise et de localiser les études en anglais, en français et en espagnol. Les données ont été examinées, extraites et analysées de manière indépendants par deux personnes. Nous avons regroupé les résultats en cinq catégories : 1) motivation pour la VD, 2) méthodologie de la VD, 3) donneurs et donneuses potentiel·les et réel·les, 4) occasions de dons manquées, et 5) amélioration de la qualité.

Constatations principales Notre recherche nous a permis de découvrir 2416 publications uniques et 52 ont été incluses dans cette revue. La plupart des études provenaient du Royaume-Uni ($n = 13$) et avaient été publiées entre 2001 et 2006 ($n = 15$). Les méthodologies décrites pour la vérification des donneuses et donneurs étaient diverses. Nos résultats ont montré que la principale motivation pour mener une VD était d'identifier des donneurs et donneuses potentiel·les et que le nombre potentiel de donneuses et donneurs d'organes après le décès était significativement plus élevé que le nombre réel. Parmi les études retenues, la proportion d'occasions de dons après un diagnostic de décès neurologique était de 95/222 (43 %), comparativement à 25/181 (14 %) pour le don après un décès cardiocirculatoire (DDC), ce qui suggère que le taux de dons manqués est plus élevé pour le DDC.

Conclusion Les vérifications des donneuses et donneurs aident à identifier les occasions de dons manquées le long du parcours de don après un décès et peuvent aider à soutenir l'évaluation des initiatives d'amélioration de la qualité.

Keywords death audits · deceased organ donation · donor audits · donor identification and referral · family decline · missed donation opportunities

Transplantation is a cost-effective treatment for organ failure,¹⁻⁵ and most transplants originate from deceased organ donors, through the neurologic determination of death (NDD) or donation after cardiocirculatory death (DCD).⁶ During 2021, a total of 2,782 Canadians received an organ transplant (1,620 from NDD, 562 from DCD, and

595 from living donors), while 250 died waiting for a transplant and 4,043 remained on transplant waitlists.⁷ The discrepancy between solid organs available for transplantation and the demand for transplants worldwide is well known and has been described extensively.^{6,8}

Barriers to the deceased organ donation process contribute to organ shortages, and donor audits (DA) can help identify these bottlenecks and enable process improvements.⁹ Information from DA can identify reasons for missed donation opportunities and help guide quality improvement strategies to enhance clinical processes, support organ donation and transplantation system performance, and ultimately provide donation opportunities to families while increasing the availability of solid organs for transplantation.⁹ Nevertheless, despite the potential impact of DA, there is a lack of comprehensive evidence on this topic, including what information DA provide, how the outputs from DA are used in clinical settings to guide quality improvement programs, and the impact of DA on assessing system performance. This scoping review aims to summarize existing literature on DA and how they have been used to guide deceased organ donation and transplantation system performance and quality assurance.

Methods

This study follows the Joanna Briggs Institute (JBI) guidance for conducting scoping reviews,¹⁰ and is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping reviews (PRISMA-ScR).¹¹ The title of this review was registered with the JBI collection.¹² The review was registered with Open Science Framework (OSF),¹³ and the protocol is available through OSF.¹⁴

Eligibility criteria

In this scoping review, we defined DA as studies and reports on the potential and actual numbers of deceased organ donors within a specific setting. Studies were considered if they reported on DA that focused on estimating the actual and/or potential number of deceased organ donors (NDD and/or DCD), both pediatric and adult, within any health care setting worldwide (e.g., intensive care units [ICU], pediatric intensive care units [PICU]). We define potential donors as patients who met the clinical referral trigger and had no absolute exclusion criteria for a donation, and actual donors as patients who consented to donation and from whom at least one organ was recovered for transplantation.

Search strategy

An experienced medical librarian developed and executed the search strategies to locate published and unpublished literature using index terms, keywords, and controlled vocabulary combining concepts from deceased organ donation and DA. The search strategy was initially developed for MEDLINE (Ovid) and adapted to the Cumulative Index of Nursing and Allied Health Literature and Web of Science. The search was conducted on 6 May 2022, and it was limited to publications after 1995 (as this was when the DCD practice was introduced)¹⁵ and in English, French, and Spanish. A web search with Google was conducted, and the first five pages of relevancy-ranked results (100 records) were screened. Complete search strategies are provided in Electronic Supplementary Material (ESM) eTable 1.

Study selection

References retrieved during the search process were uploaded into Covidence® and duplicates were removed before the screening process. Preceding each screening, a pilot test was conducted to calibrate the screening process among reviewers with 20 references considering an agreement level of at least 95% in the decisions among the reviewers. References were screened by title and abstract for eligibility, and then at the full-text level when required by two reviewers, independently (L. J. and J. L.). Discrepancies between reviewers were resolved either by consensus or through discussion.

Data extraction and analysis

A reviewer (L. J. or J. L.) extracted data from the included studies and this process was verified by another reviewer (A. S.), using a data extraction form developed for this study. The data extraction form included aspects relevant to answer the research questions of the study (e.g., audit criteria, sample, procedures, the reason for missed donation, and quality assurance). Disagreements between reviewers during the data extraction were resolved by consensus through discussion. Following data extraction, we quantitatively described the characteristics of the included studies using a simple descriptive numeric count and used an inductive content analysis approach to categorize the main findings into major qualitative categories. The content analysis is the only qualitative approach allowed in scoping reviews according to JBI.¹⁶ In this analysis process, we used an inductive approach (where codes are driven from the literature and are not established prior to the start of the analysis) to create a series of codes that are later grouped into major categories

to summarize the existing evidence. A quality appraisal was not included following the JBI methodology,¹⁶ as we intended to map the literature with a broad lens using a subjectivist approach.¹⁷

Results

The search process yielded 2,416 unique citations, 139 of which were relevant and screened at the full-text level, and 52 of which were ultimately included (Figure). Most studies were from the UK ($n = 13$, 25%) and published between 2001 and 2006 ($n = 15$, 29%). Specific details of each study can be found in ESM eTable 2. Following the inductive content analysis approach, our results were divided into five categories: 1) motivation for DA, 2) DA methodology, 3) potential and actual donors, 4) missed donation opportunities, and 5) quality improvement.

Motivation for donor audits

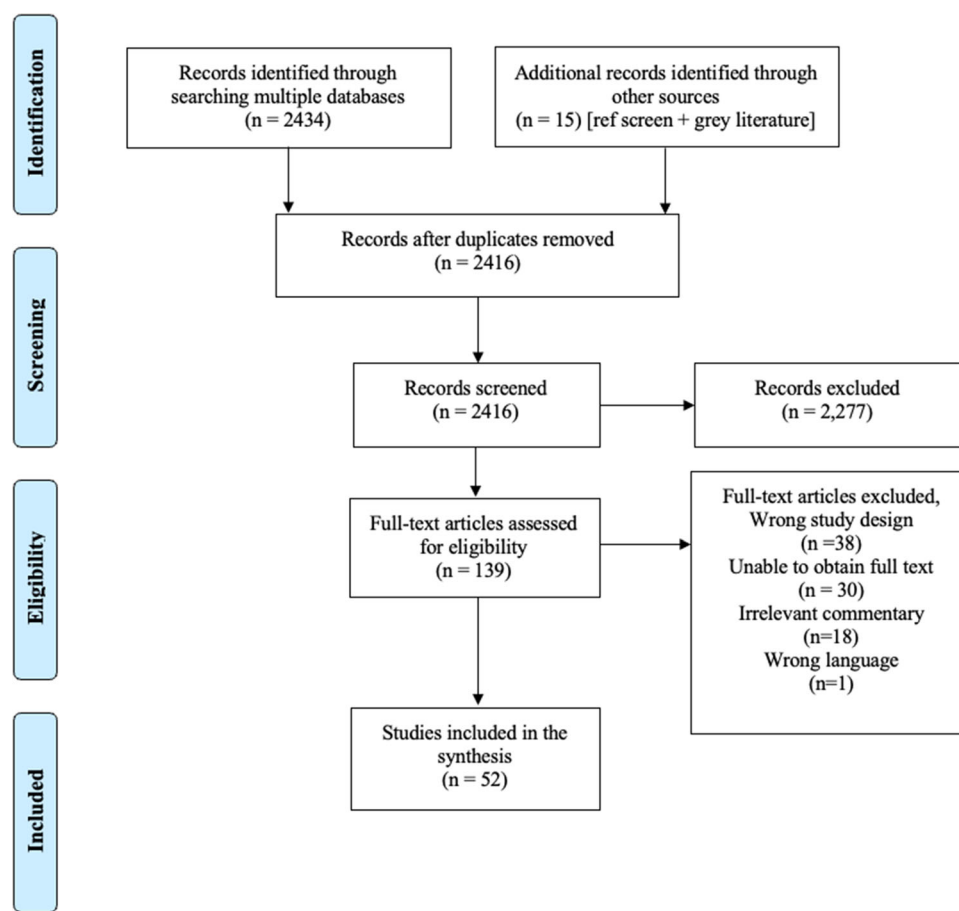
A total of 36 studies mentioned the motivation behind performing DA. The primary motivation was to estimate the potential for deceased organ donation to maximize the provision of organs for transplant ($n = 36$). Other specific motivations included increasing DCD ($n = 1$),¹⁸ informing the development of DCD programs ($n = 6$),^{19–24} increasing the identification of organ donors in emergency departments ($n = 1$),²⁵ informing quality improvement ($n = 5$),^{26–30} and supporting the education of health care professionals involved in deceased organ donation ($n = 3$).^{29,31,32}

Donor audits methodology

A retrospective study design of deaths, with or without the inclusion of prospective data analysis, was the common design for DA. The majority of studies were performed in adult ICUs ($n = 24$), followed by other medical units ($n = 9$), emergency departments ($n = 6$), and neonatal or PICUs ($n = 3$). Other studies ($n = 10$) did not specify the setting. Most studies investigated the potential for NDD ($n = 21$), followed by both NDD and DCD ($n = 15$) and DCD only ($n = 8$). This was not specified in eight studies. Additionally, most studies focused on both adult and pediatric patients ($n = 25$), followed by pediatric patients ($n = 6$) and adult patients only ($n = 6$). This was not reported in 15 studies.

Very few studies provided insight into the costs associated with the implementation and routine conduction of DA, including the potential for return on investment.^{32,33} In one study, it was reported that retrospective reviews of medical records, such as DA,

Figure Preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews flow chart



were costly, labour-intensive, and required good patient documentation.³³ In contrast, another study reported that an initiative including DA to guide quality improvement strategies could be economically advantageous in terms of cost-benefit.³² To support their statement, they estimated that the total cost of this initiative in Germany was approximately EUR 218 million for the whole country and that this program could increase organ donation rates by 59%, which would be more cost-effective than other medical interventions for patients awaiting transplantation.³²

Potential and actual donors

The primary purpose of conducting DA was to estimate the potential for deceased organ donation, so organizations can use this data to assess program performance including missed donation opportunities. Data from DA show the potential for deceased organ donation to be considerably higher than actual donation rates (ESM eTable 3). There was, however, a lack of reports on utilized donors (actual donors from whom at least one organ was transplanted) in DA. From studies with parallel analysis of potential and

actual organ donors ($n = 27$), approximately one-third of potential donors become actual donors (29,000 donors out of 77,007 potential donors). Furthermore, studies^{31,34,35} that separately evaluated the potential for DCD and NDD reported a higher proportion of missed donation opportunities for DCD. The NDD donation rate, when compared with potential NDD opportunities, was 43% (NDD potential = 222; NDD actual = 95), and for DCD this rate was 14% (DCD potential = 181; DCD actual = 25).^{31,34,35}

Barriers to missed donation opportunities

We identified 45 studies describing potential barriers to missed donation opportunities. Among those, family decline was the most frequent ($n = 24$),^{25,27–29,33–52} followed by failure to identify potential donors (and/or referral to organ procurement) ($n = 19$),^{22,25,26,29,33–35,38,40,43,44,46–48,53–57} poor donor management where organs accrued more injury as a result of medical management ($n = 4$),^{38,39,41,48} not approaching families for donation ($n = 4$),^{36,43,46,58} prolonged time to death after withdrawal of

Table 1 Reasons for family declining organ donation

Reason	Reference
Not sure about the patient's desire for donation	$n = 4$ ^{31,32,45,46}
The patient did not want donation	$n = 4$ ^{31,32,45,46}
Reason not documented	$n = 4$ ^{22,23,31,32}
Did not want surgery on the body	$n = 2$ ^{31,32}
Felt the patient had suffered enough	$n = 2$ ^{31,32}
The family was divided related to donation (some members were supportive and others were not, thus the agreement was not reached among decision-makers)	$n = 2$ ^{31,32}
Religious reasons and beliefs	$n = 2$ ^{31,45}
The family did not agree with organ donation	$n = 2$ ^{31,45}
The need to delay withdrawal of life-sustaining measures for donor evaluation	$n = 2$ ^{30,45}
Prolonged hospital stays	$n = 2$ ^{30,46}
Poor approach for consent from health care professionals	$n = 2$ ^{37,54}
Family uncertainty around death diagnosis	$n = 1$ ⁵⁴
The fact that organs from pediatric donors will likely be for an adult recipient	$n = 1$ ³⁰
Lack of trust in the health care system	$n = 1$ ⁵⁴
The family wanted to be with the patient when the ventilator was turned off	$n = 1$ ³¹
The need for extra procedures	$n = 1$ ³⁰

life-sustaining measures ($n = 3$),^{19,20,35} coroner refusal ($n = 2$),^{44,45} legal issues ($n = 1$),²¹ and medical instability ($n = 1$).³⁹ The reasons that led family members to decline deceased organ donation were numerous and included complex sociocultural aspects. The specific reasons identified for family decline can be found in Table 1.

Furthermore, the authors identified a series of characteristics that could influence whether a potential donor progresses to an actual donor. When controlling for available predictors (e.g., sex, age group, and ethnicity), a group from the UK identified that ethnic minorities were twice less likely to provide donation consent for a family member when compared with white potential donors.^{36,37} Another group from the USA identified that parental permission was relatively lower for DCD when compared with NDD.³⁵ On the other hand, in a study from the Netherlands, families made the final decision for organ donation and declined even if the donor had expressed their intent to donate their organs after death.²⁷ Organizational factors could also impact the deceased organ donation process. As such, the NDD process was found to have greater efficacy in hospitals without a neurosurgery service (48% of potential donors become actual donors when compared with 32% in larger hospitals with neurosurgery service).²⁸ Larger hospitals (with 150 or more beds) were more likely to have potential and actual donors.⁴⁹ Finally, one study indicated that nonidentification of donors was more likely observed in emergency room departments rather than in the ICU.³⁴

Quality improvement

We identified 48 studies that mentioned the implementation of quality improvement programs and/or suggestions to enhance the deceased organ donation clinical pathway. For instance, two studies^{25,28} used data from DA along with barriers cited by health care professionals to identify appropriate education for health care professionals involved in the donation process. In one study, the authors described two initiatives designed to maximize the potential for donation in ICUs: an educational training program and another program that used information from chart reviews (DA as a diagnosis phase) to develop guidelines and resources to enhance the quality of organizational processes.⁵⁹ Lastly, authors from various studies offered a series of suggestions to help improve the organ donation process and optimize donation opportunities. Details of these suggestions can be found in Table 2.

Discussion

In this scoping review, we identified 52 studies and described how DA provide valuable data on donation and transplantation system performance. As such, DA help estimate the number of potential donors in a specific population, quantify the number of actual donors, and highlight areas for improvement. Published DA show the potential for increasing deceased organ donation given the

Table 2 Authors' suggestions to improve the deceased organ donation process

Suggestion	Reference
Clear guidance and/or programs for DCD	$n = 44$ ^{15,17,18,29}
Increase health care professionals' awareness and education related to donation	$n = 16$ ^{20,21,24,26,31,35–38,40,43,56–60}
Improve approach to family members	$n = 8$ ^{28,36,37,40,43,53,56–58}
Public education	$n = 7$ ^{24,26,28,35,38,57,60}
Early brain-death testing	$n = 3$ ^{35,53,56}
More organizational resources (e.g., intensive care beds)	$n = 2$ ^{37,38}
Improve emergency department approach to organ donation	$n = 2$ ^{17,57}
Stronger interdisciplinary relationships	$n = 2$ ^{40,44}
Improve the process to reduce waiting time for donation	$n = 1$ ³⁵
Have an in-hospital person in charge of deceased organ donation	$n = 1$ ²¹
Improve motivation among transplant coordinators (e.g., providing outcomes for organ recipients)	$n = 1$ ⁴⁰
Improve guidance around the possibility of hepatitis C-positive patients becoming organ donors	$n = 1$ ²⁵

DCD = donation after cardiocirculatory death

high incidence of missed donation opportunities, which were mainly due to failure to identify potential donors and family decline. These missed donation opportunities were higher for DCD than for NDD.

The reasons for family decline of organ donation are many and include sociocultural aspects that are complex and difficult to tackle.⁶⁰ Although many DA identified reasons why families decline the donation opportunity, other studies reported they could not discern the reasons for the family decline. For instance, two studies identified family decline as a major barrier to donation conversion rates, but they could not identify the specific reasons leading families to decline donation given the lack of documentation in health records.^{28,34} Conducting DA presupposes suitable patient documentation,³³ but our scoping review shows that this is not always the case. Specific costs related to conducting DA were not reported and there is no evidence of cost-effectiveness. Nevertheless, when the results of DA are used to guide quality improvement programs that enhance donation conversion rates, small increases in deceased donations could potentially be cost-effective.⁶¹

Donation after circulatory death is relatively new compared with NDD donation, and while the first case of NDD donation was reported in 1954, DCD practice only started around 1995. Accordingly, reports from the literature show DCD opportunities are significantly more overlooked than NDD opportunities.^{31,34,35} More DCD programs need to be established and existing programs need to be improved to enhance DCD practices and health care professionals' preparedness to work with DCD to help fulfill donation opportunities.^{20,22,23,34}

Many studies were designed to use data from DA for quality improvement purposes. As highlighted in several

studies, efforts should be made towards strengthening deceased organ donation practices and reducing missed donation opportunities. Studies consistently mentioned the need to explore how best to identify potential donors and improve family approach (e.g., adequate training for health care professionals on how to start conversations about organ donation and obtaining consent) to reduce the rates of decline, a significant barrier to donation. Our findings are in accordance with those of a recent Canadian conference on organ donation having concluded that more educational programs should be developed to increase these professionals' awareness of organ donation, as well as improve their knowledge and skills to support donation practices (e.g., identification of potential donors, donor management, and family approach).⁶²

Limitations of the study

Scoping reviews are designed to give a broad overview of a topic and not to identify the efficacy of an intervention, such as DA, in clinical practice. Additionally, our study design focused on DA but other study designs could be relevant when discussing barriers to organ donation and methods to minimize missed donation opportunities. Also, the number of donors who had at least one organ harvested and transplanted was not always clear in the included studies. The number of actual donors may have been under- or overestimated. Lastly, we did not appraise the risk of bias in studies in accordance with the JBI guidance for scoping reviews. The quality of the evidence is thus difficult to determine.

Conclusion

In this scoping review, we identified numerous examples where DA in deceased organ donation provided better insight into organ donation programs in different countries and settings. Most DA focused on estimating the potential for organ donation, quantifying the actual number of deceased organ donors, and identifying missed donation opportunities. We identified several barriers to deceased organ donation that could help minimize missed donation opportunities. Donor audits can help support quality improvement programs aimed at improving access to organ transplants.

Author contributions Amina Silva, Lee James, Jehan Lalani, Shauna O'Donnell, Samara Zavalkoff, Alexandre Amar-Zifkin, and Sam D. Shemie contributed to designing, drafting, and reviewing this review and all fulfilling the International Committee of Medical Journal Editors criteria for authorship.

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Data availability All existing data are available within the manuscript.

Editorial responsibility This submission was handled by Dr. Alexis F. Turgeon, Associate Editor, *Canadian Journal of Anesthesia/Journal canadien d'anesthésie*.

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