



# Defining Quality Criteria for Success in Organ Donation Programs: A Scoping Review

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## Abstract

**Background:** Well-established performance measures for organ donation programs do not fully address the complexity and multifactorial nature of organ donation programs such as the influence of relationships and organizational attributes.

**Objective:** To synthesize the current evidence on key organizational attributes and processes of international organ donation programs associated with successful outcomes and to generate a framework to categorize those attributes.

**Design:** Scoping Review using a mixed methods approach for data extraction.

**Setting:** Databases included PubMed, CINAHL, Embase, LILACS, ABI Business ProQuest, Business Source Premier, and gray literature (organ donation association websites, Google Scholar—first 8 pages), and searches for gray literature were performed, and relevant websites were perused.

**Sample:** Organ donation programs or processes.

**Methods:** We systematically searched the literature to identify any research design, including text and opinion papers and unpublished material (research data, reports, institutional protocols, government documents, etc). Searches were completed on January 2018, updated it in May 2019, and lastly in March 2020. Title, abstracts, and full texts were screened independently by 2 reviewers with disagreements resolved by a third. Data extraction followed a mixed method approach in which we extracted specific details about study characteristics such as type of research, year of publication, origin/country of study, type of journal published, and key findings. Studies included considered definitions and descriptions of success in organ donation programs in any country by considering studies that described (1) attributes associated with success or effectiveness, (2) organ donation processes, (3) quality improvement initiatives, (4) definitions of organ donation program effectiveness, (5) evidence-based practices in organ donation, and (6) improvements or success in such programs. We tabulated the type and frequency of the presence or absence of reported improvement quality indicators and used a qualitative thematic analysis approach to synthesize results.

**Results:** A total of 84 articles were included. Quantitative analysis identified that most of the included articles originated from the United States ( $n = 32, 38\%$ ), used quantitative approaches ( $n = 46, 55\%$ ), and were published in transplant journals ( $n = 34, 40.5\%$ ). Qualitative analysis revealed 16 categories that were described as positively influencing success/effectiveness of organ donation programs. Our thematic analysis identified 16 attributes across the 84 articles, which were grouped into 3 categories influencing organ donation programs' success: *context* ( $n = 39, 46\%$ ), *process* ( $n = 48, 57\%$ ), and *structural* ( $n = 59, 70\%$ ).

**Limitations:** Consistent with scoping review methodology, the methodological quality of included studies was not assessed.

**Conclusions:** This scoping review identified a number of factors that led to successful outcomes. However, those factors were rarely studied in combination representing a gap in the literature. Therefore, we suggest the development and reporting of primary research investigating and measuring those attributes associated with the performance of organ donation programs holistically.

**Trial Registration:** Not applicable.

## Abrégé

**Contexte:** Les mesures de rendement bien établies pour les programmes de dons d'organes ne tiennent pas entièrement compte de la complexité et de la nature multifactorielle de ces programmes, notamment de l'influence des relations et des attributs organisationnels.



**Objectif:** Synthétiser les données actuelles sur les processus et les principaux attributs organisationnels des programmes internationaux de dons d'organes qui sont associés à des résultats favorables, et générer un cadre pour classer ces attributs.

**Type d'étude:** Examen de la portée où une approche à méthodes mixtes a servi à l'extraction des données.

**Sources:** Ont été consultées les bases de données PubMed, CINAHL, Embase, LILAS, ABI Business ProQuest et Business Source Premier, ainsi que la littérature grise (huit premières pages de Google Scholar) et les sites Web pertinents (sites Web d'associations de dons d'organes).

**Échantillon:** Les programmes ou processus de don d'organes.

**Méthodologie:** Nous avons procédé à une recherche systématique de la documentation pour répertorier tout plan de recherche pertinent, y compris les manuscrits, articles d'opinion et documents non publiés (données de recherche, rapports, protocoles institutionnels, documents gouvernementaux, etc.). Les recherches se sont terminées en janvier 2018 et ont été mises à jour en mai 2019 et en mars 2020. Les titres, les abrégés et les textes complets ont été révisés de façon indépendante par deux examinateurs; les désaccords ayant été résolus par un troisième. Une combinaison de méthodes a été employée pour l'extraction des données, lesquelles incluaient notamment des détails concernant l'étude (type de recherche, année de publication, pays/origine de l'étude, type de publication, principales conclusions). Les études retenues définissaient et donnaient une description du succès des programmes de dons d'organes dans tout pays; l'examen s'est concentré sur les études décrivant: 1) les attributs associés au succès ou à l'efficacité; 2) les processus de don d'organes; 3) les initiatives d'amélioration de la qualité; 4) les définitions de l'efficacité du programme; 5) les pratiques fondées sur des données probantes, et; 6) les améliorations ou le succès des programmes. Pour chaque amélioration mentionnée, le type et la fréquence de la présence ou de l'absence d'indicateurs de la qualité ont été colligés pour chaque amélioration mentionnée, et une méthode d'analyse thématique qualitative a servi à synthétiser les résultats.

**Résultats:** En tout, 84 articles ont été inclus. L'analyse quantitative a révélé qu'en majorité, les articles provenaient des États-Unis ( $n=32$  [38 %]), qu'ils utilisaient des approches quantitatives ( $n=46$  [55 %]) et qu'ils avaient été publiés dans des revues de transplantation ( $n=34$  [40,5 %]). L'analyse qualitative a dégagé 16 catégories décrites comme ayant une influence positive sur le succès et l'efficacité des programmes de dons d'organes, alors que l'analyse thématique a permis de répertorier 16 attributs. Ces derniers ont été classés dans trois catégories influençant le succès des programmes de dons d'organes: le contexte ( $n=39$  [46 %]), le processus ( $n=48$  [57 %]) et la structure ( $n=59$  [70 %]).

**Limites:** Conformément à la méthodologie d'un examen de la portée, la qualité méthodologique des études incluses n'a pas été évaluée.

**Conclusion:** Cet examen de la portée a permis de dégager un certain nombre de facteurs menant à des résultats favorables; ceux-ci ont cependant rarement été étudiés en combinaison, ce qui constitue une lacune dans la littérature. Dès lors, nous suggérons l'élaboration et la présentation de rapports de recherche visant à étudier et à mesurer les attributs associés au rendement des programmes de dons d'organes de façon holistique.

## Keywords

organ donation programs, organ and tissue donation coordinators, program evaluation, quality indicators, performance measures

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## Introduction

Health care systems must prioritize effective organ donation programs for people requiring life-saving transplants. Accompanying the increasing number of people 65 years plus<sup>1</sup> come chronic diseases such as diabetes and high blood pressure more prevalent in this population.<sup>2</sup> These conditions are major risk factors for end-stage kidney disease,<sup>2,3</sup> and

kidneys are the most frequently transplanted organs since they can be donated by living or deceased persons. Currently, more than 50 000 Canadians are being treated for kidney failure; 58% receive some form of dialysis.<sup>4</sup> The average cost of dialysis treatment per year in Canada is \$56,000 to \$107,00.<sup>5</sup> The estimated cost of a kidney transplant in Canada is \$100,000 per patient in the first year, and \$20,000 in subsequent years for follow-up and drugs, representing a

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potential cost savings of \$116,000 in comparison to dialysis treatment over six years.<sup>6</sup> As kidney transplants are the most common transplant performed, we have a better understanding of the public economic costs of chronic treatment of end-stage organ failure patients versus transplantation than for other organ transplants. However, when the benefit of transplantation is measured with quality-adjusted life-year gained by the procedure, individuals receiving other organs such as heart,<sup>7</sup> lung,<sup>8,9</sup> and liver<sup>10,11</sup> also benefit. Thus, both people and systems benefit from organ transplantation.

To fulfill every opportunity for donation and reduce the waiting list, organ donation programs must operate optimally. However, well-established performance measures for organ donation programs (ie, number of deceased donors, rate of organs offered and accepted, estimated potential donors, number of cases of brain death per institution, etc.)<sup>12</sup> do not fully address the complexity and multifactorial nature of such programs<sup>13</sup> that include the influence of relationships and organizational attributes. For this reason, we need to consider the organ donation system as a whole rather than as small parts or sectors to identify the components of successful organ donation programs.<sup>13</sup>

## Objective

This study sought to conduct a scoping review to collate and synthesize the available literature on key organizational attributes and processes of international organ donation programs associated with successful outcomes and to generate a framework to categorize those attributes. This article outlines our review methodology and results, including the identification of the research gap and recommendations for future research. Our review question was: *What are the organizational attributes and processes of international organ donation programs associated with success?*

## Methods

A scoping review can be undertaken for different reasons that include examination of the extent, range, and nature of research activity; dissemination of research findings or identification of gaps in the existing literature<sup>14</sup>; and clarification of a complex concept and refinement of subsequent research inquires,<sup>15</sup> which is the purpose of this research. This systematic scoping review was conducted in accordance with the Joanna Briggs Institute methodology for scoping reviews.<sup>16,17</sup> The research protocol was not published, but the protocol was developed and reviewed by researchers from the Queen's Collaboration for Health Care Quality JBI Centre of Excellence.

### Identifying Relevant Studies

We performed a 3-step search strategy to find both published and unpublished studies. First, we undertook an

initial limited search (keywords used were *organ donation, program, legislation and policy, effectiveness, and success*) of PUBMED and Cumulative Index of Nursing and Allied Health Literature (CINAHL) to identify the best search terms and keywords. Second, a librarian with expertise in systematic reviews assessed the search parameters and then applied by the first author to 6 databases, PUBMED, CINAHL, EMBASE, LILACS, ABI Business ProQuest, and Business Source Premier (Table 1). Third, we searched grey literature on organ donation association websites, Google Scholar (first 8 pages), and Research Gate. Finally, we scanned the reference lists of all identified reports and articles for additional papers, purposely keeping the search broad to capture all possible strategies. We conducted the search in January 2018, updated it in May 2019, and lastly in March 2020. We established no year limit for searches, but only studies published after 1980 were examined as it was around this time that organ transplantation started to become a more common and successful treatment for end-stage organ failure; policies and practices began to be developed and the need for the coordination of organ donation and transplantation was identified.<sup>18</sup> We considered full texts available in Spanish, Portuguese, and/or English.

### Study Selection

We exported search results from each database to an EndNote file and then uploaded it into an online data review portal (Covidence). Two reviewers conducted screening and selection for inclusion in accordance with the inclusion criteria described below. Both reviewers also carried out full-text reviews for all potential articles. Both reviewers voted independently to include or exclude each record, resolved their disagreements through discussion, and consulted a third reviewer when required.

### Inclusion Criteria

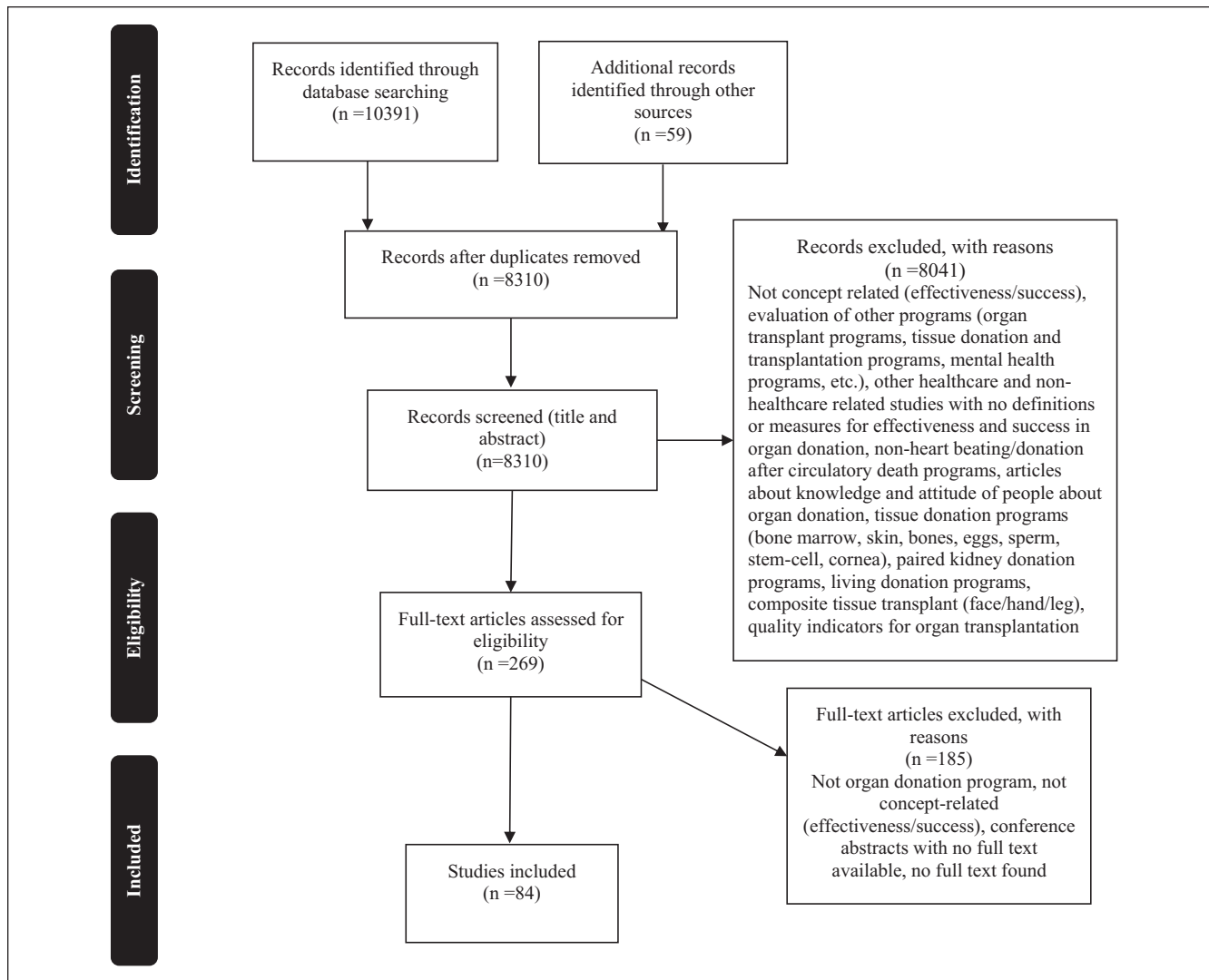
We examined definitions and descriptions of success in organ donation programs in any country by considering studies that described (1) attributes associated with success or effectiveness, (2) organ donation processes, (3) quality improvement initiatives, (4) definitions of organ donation program effectiveness, (5) evidence-based practices in organ donation, and (6) improvements or success in such programs. Specifically, we reviewed documents that described in any level the evaluation of deceased organ donation programs and/or processes. Examples included if a study described national or local organ donation organizations (ODOs) evaluated, a potential organ donor identified, potential organ donors referred from the hospital to the ODO, organ donor maintenance, brain death diagnosis, family interview for organ donation, organ allocation, and/or organ retrieval surgery.

This scoping review considered any research design, including text and opinion papers and unpublished material

Table 1. Search Strategy.

Database	Search strategy	Limits
PUBMED	((“organ procure*” OR “organ donat*” OR “organ retriev*” OR “organ harvest*” OR “tissue procure*” OR “tissue donat*” OR “tissue retriev*” OR “tissue harvest*”) AND (legislat* OR polic* OR program OR programs OR programme OR programmes OR programming OR effective* OR success* OR “comparative effectiveness research” OR “cost-benefit analysis” OR “quality indicators”))	full text, English, Portuguese, Spanish, and humans
CINAHL via EBSCO Host Interface	((MH “Organ Procurement+”) OR “organ donation” OR (MH “Tissue and Organ Harvesting+”) OR “organ retrieval” OR “tissue donation” OR “tissue retrieval”) AND, (MH “Policy and Procedure Manuals”) OR (MH “Hospital Policies”) OR (MH “Public Policy”) OR (MH “Health Policy”) OR (MH “Organizational Policies”) OR “policies” OR (MH “Legislation+”) OR “program” OR “programs” OR “programme” OR “programmes” OR “programming” OR “effective*” OR (MH “Success”) OR “comparative effectiveness research” OR (MH “Cost Benefit Analysis”) OR “quality indicators”)	full text, English, Portuguese, Spanish, and humans
EMBASE via Ovid Host Interface	1. organ procure*.mp. 2. organ donat*.mp. 3. organ retrieval.mp. 4. organ harvest*.mp. 5. tissue procure*.mp. 6. tissue donat*.mp. 7. tissue retriev*.mp. 8. tissue harvest*.mp. 9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 10. legislat*.mp. 11. polic*.mp. 12. program.mp. 13. programs.mp. 14. programme.mp. 15. programmes.mp. 16. programming.mp. 17. effective*.mp. 18. success*.mp. 19. exp Comparative Effectiveness Research/ 20. Exp Cost-Benefit Analysis/ 21. “quality indicators”.mp. 22. 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 23. 9 and 22	full text, English, Portuguese, Spanish, and humans
LILACS	((“organ procure*” OR “organ donat*” OR “organ retriev*” OR “organ harvest*” OR “tissue procure*” OR “tissue donat*” OR “tissue retriev*” OR “tissue harvest*”) AND (legislat* OR polic* OR program OR programs OR programme OR programmes OR programming OR effective* OR success* OR “comparative effectiveness research” OR “cost-benefit analysis” OR “quality indicators”))	full text, English, Portuguese, Spanish, and humans
ABI Business ProQuest	((organ procurement) OR (organ donation) OR (organ retrieval) OR (organ harvesting) OR (organ procurement) OR (tissue procurement) OR (tissue donation) OR (tissue retrieval) OR (tissue harvesting)) AND ((legislation) OR (policies) OR (program) OR (programs) OR (programme) OR (programmes) OR (cost-benefit analysis) OR (quality indicators))	full text, English, and humans
Business Source Premier	((“organ procure*” OR “organ donat*” OR “organ retriev*” OR “organ harvest*” OR “tissue procure*” OR “tissue donat*” OR “tissue retriev*” OR “tissue harvest*”) AND (legislat* OR polic* OR program OR programs OR programme OR programmes OR programming OR effective* OR success* OR “comparative effectiveness research” OR “cost-benefit analysis” OR “quality indicators”))	full text, English, Portuguese, Spanish, and humans

Note. OR = odds ratio.



**Figure 1.** Scoping review results in a modified Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA ScR) diagram.

(research data, reports, institutional protocols, government documents, etc.).

**Data Extraction and Charting**

We extracted relevant descriptive information from papers included using a template developed specifically for this review. The data extraction included details about the type of research, year of publication, origin/country of study, type of journal published, and key findings. We tabulated the type and frequency of the presence or absence of reported improvement quality indicators. We used NVIVO to perform a qualitative directed content analysis to summarize and synthesize the results from the scoping review.<sup>19</sup> Data were extracted by 2 independent reviewers and the data analysis was an iterative process, in which we used a combination of inductive and deductive coding approaches. Emergent

coding was used for emerging themes.<sup>20</sup> During the analysis process, the codes were recorded and matched to find the majority consensus across the data. Data from the qualitative analysis was presented descriptively.

**Results**

Figure 1 summarizes search results and study selection in an adapted Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA ScR) flow diagram.<sup>21</sup> Of the 10391 articles identified, we considered 84 papers eligible for this review. Included articles contained direct and indirect descriptions of the effectiveness/success of organ donation programs. The majority of included articles originated from the United States of America (USA) (n = 33, 39%), used quantitative approaches (n = 46, 55%), and were published in transplant journals (n = 33, 39%).

Table 2 contains additional information from the included papers.

Figure 2 presents 16 attributes across 84 articles identified by our thematic analysis. We grouped these into the following 3 categories influencing the success of organ donation programs: (1) context describes the external or organizational environment in which the programs are embedded that might have an impact (positive or negative) on their performance; (2) process denotes any organizational steps or procedures used to facilitate the process; and (3) structures defines any organizational structural components such as financial and human resources, technologies, specialty physicians, etc.

For each category, Table 3 shows relevant attributes collocated for each retrieved article and Table 4 highlights the frequency of reporting and if the effects of these attributes were assessed in relation to quality indicators. We developed a conceptual map to better illustrate the results of this scoping review (Figure 3).

## Themes and Discussion

### Context

**Ethical dilemmas.** Ethical dilemmas, which we identified in 5 papers,<sup>22-26</sup> included reports of practices that could be interpreted as ethically inappropriate or potentially harmful. Inequities in access to transplant programs may influence patients to seek unethical and potentially harmful alternatives: transplant tourism.<sup>22,23</sup> Organ donation and transplantation, groups worldwide have been working to either find ways to increase the availability of organs for transplantation or to prevent negative consequences to healthcare systems and patients.<sup>23</sup> Organ selling and lack of control over living donations and over brain death diagnosis prevented an increase in legitimate organ donation rates in South Korea before legislation regulated organ donation and transplantation.<sup>24</sup> In addition, despite worldwide concern regarding the unethical use of monetary incentives to organ donor families, the literature reported this practice,<sup>24,25</sup> as well as that of persuading families to donate.<sup>26</sup> ODOs must monitor and employ ethical use of initiatives to improve donation rates. Other ethical dilemmas were not captured with our search strategy, but are worth mentioning. The ethical and moral dilemmas surrounding the motives of people who donate their organs following medical assistance in dying,<sup>27</sup> the fairness of directed organ donation,<sup>28,29</sup> the time of death for organ donors after circulatory determination of death patients,<sup>30-32</sup> and the family veto on the deceased's donation decision<sup>33,34</sup> are some of the various examples of dilemmas that healthcare professionals working in organ donation programs face.

**Shared vision.** In 9 papers<sup>35-43</sup> we identified shared vision, which included reports of an institutional culture that openly

supports and promotes organ donation efforts through incorporating organ donation into policies, procedures, medical records systems, training, staffing, finances, data collection, and/or quality improvement actions. Embedding organ donation with institutional beliefs or mission increases organ donation rates.<sup>36,41,42</sup> Heightened awareness of the importance of organ donation sensitizes people to the need and likely leads them to identify potential donors, refer donors to ODOs, influence other colleagues, and collaborate with the organ donation coordinator/organizations during donation processes.<sup>35,44</sup> A culture of donation provides seamless integration of organ donation processes<sup>39</sup> as it becomes a usual part of end of life care.<sup>40</sup> Consensus in the design of organ donation processes and a quality improvement program support program goals.<sup>38</sup> Some strategies to implement shared vision include adding the topic to employees' training and orientation or to organizational messages.<sup>45</sup> In addition, the literature also discusses the importance of developing a culture of donation beyond institutions through engaging not only health professionals but also the general public to increase awareness and overcome misconceptions and cultural/religious barriers.<sup>37,43</sup>

**Public policies.** In 12 papers<sup>22,24,40,43,46-53</sup> we identified this attribute, which included reports of developing and implementing national or local policies to regulate and organize organ donation and transplantation activities and set actions to improve organ donation rates. National and local policies may lead to successful outcomes in organ donation programs. Even though the president of Spain's National Transplant Organization states that success in their country's organ donation rates is not believed to result from opt-out policies,<sup>40</sup> presumed consent may be an alternative to countries that experience consistently low rates.<sup>50</sup> For example, donation rates increased in Wales after presumed consent legislation was implemented. Even though reports about other countries' experiences with presumed consent legislation did not meet the inclusion criteria for this scoping review, they provide further context. An increase in donation rates was identified in Belgium, Austria, and Singapore, but it was not possible to identify if the increase was a direct consequence of the legislation changes or with the increased publicity and infrastructure improvements implemented at the same time,<sup>54</sup> whereas for other countries such as Chile<sup>55</sup> and Brazil,<sup>56</sup> the implementation had negative effects on donation numbers. When evidence-based strategies to improve donation rates are promoted through publicity, public education, and infrastructure improvements, increased donation rates are more likely to occur.<sup>46,47,51</sup> National transplant organizations that provide national oversight and supportive legislation effectively manage regulations, professional standards and ethics,<sup>21,23,42,51</sup> monitoring and evaluating organ donation and transplantation programs,<sup>47,48</sup> and quality and safety,<sup>56</sup> and consequently increase organ donation rates. National standardization of quality improvement policies for organ

**Table 2. Data Extracted from the Included Papers.**

Authors	year	Country	Type	Aim	Key Findings/Topics discussed
Adler JT et al. <sup>81</sup>	2016	USA	Quantitative	To assess the impact of market competition on measures of OPO performance; To further quantify the impact of increasing competition through broader sharing of organs	Competition within the donor service areas was strongly associated with OPO performance competition was associated with greater demand for organs leading to variation in donor characteristics and organ quality
Alban R et al. <sup>65</sup>	2013	USA	Quantitative	To analyze yearly conversion rates, DCD donation and population demographics before and after implementation of policy changes to improve donation rates	Improvements in hospital-wide and trauma service-specific conversion rates was observed improvements were thought to be a result of the changes implemented but not actually measured
Alonso M et al. <sup>78</sup>	1999	Spain	Quantitative	To evaluate the donation results after the implementation of the donor action program	Increases in donor identification rates, in staff involvement in donation cases, and actual donors, and decrease in family refusal rates were identified
Anker and Feeley <sup>46</sup>	2011	USA	Mixed Methods	To deeply examine the messages used by organ procurement coordinators in shaping familial requests for organ donation	15 different message strategies used by OPCs in communicating with potential donor families that were identified and classified within 4 themes: provide education, debrief benefits to donation, learn about the potential donor family and persuasive tactics to influence donation
Anker and Feeley <sup>97</sup>	2011	USA	Qualitative	To identify the communication strategies used by organ procurement coordinators in forming donation requests to identify the communication strategies that are significantly related to higher conversion rates at the organ procurement organization level	Request process varied and 2 strategies demonstrated significant positive association with conversion rates and 5 strategies with negative association with conversion rates.
Bair HA et al. <sup>36</sup>	2006	USA	Quantitative	To evaluate the implementation of evidenced based practice initiatives to increase organ donation	Significant improvement in the donor conversion rate and number of organs available for transplant.
Balleste C et al. <sup>83</sup>	2015	Trinidad and Tobago	Quantitative	To add further evidence of the effectiveness of the SEUSA program	Increased potential donor referrals, reduced family refusal, and increased kidney transplantation were identified.
Barnieh L et al. <sup>101</sup>	2006	Canada	Quantitative	To compare donor per million of population (DPMP) from Spain to that of a major urban centre in Canada	Crude DPMP was identified as an imperfect measure of organ donation program performance.
Bhopal A <sup>37</sup>	2019	UK	Opinion Paper	N/A	Author discusses opt-out legislation implementation and its consequences to organ donation processes.
Blok GA <sup>92</sup>	2005	Netherlands	Quantitative	To identify if satisfaction of donor relatives have change over the years to explore to which variables these changes can be attributed	Satisfaction has increased over the years the majority of relatives felt free to decide about donation, but 20-30% felt pressured by either relatives or hospital staff. Relative's feelings of anger and of being neglected correlated significantly with the treatment by doctors.
Carr-Hill RA <sup>102</sup>	2018	UK	Opinion Paper	N/A	author discusses the experience of Wales with the implementation of opt-out legislation in terms of changes noticed in donation rates and improvement opportunities identified.
Cuende N et al. <sup>58</sup>	2007	Spain	Quantitative	To assess the impact of the level of population aging on the rates of deceased organ donation by adjusting these rates for age	Authors reported that the old-age index (percentage of population aged 65 years or over) accounted for 33% of the differences in donation rates between countries, and suggest that comparison of rates of donor per million of population should be made after adjusting for age.
Czerwinski J et al. <sup>103</sup>	2016	Poland	Quantitative	To assess the activity in the field of organ donation from brain-dead donors in hospitals included and not included in EPOD training program and before training, directly after the training and after a longer period of time, by comparing organ donation indicators	Hospitals that participated in the EPOD program had an increase in organ donation indicators greater than the ones that did not participate.
Das KK et al. <sup>46</sup>	2007	USA	Mini Review	N/A	Authors examine, from the perspective of kidney transplantation, the key findings of the Institute of Medicine's report on current problems facing organ donation in the US. Specifically, on presumed consent, they support the implementation of a large and comprehensive education campaign to generate true informed consent decisions and promote cultural acceptance.
Davis BD et al. <sup>84</sup>	2013	USA	Quantitative	To examine donation consent rates of an OPO by institution and by race between 2002 and 2010	A marked increase in the number of patients referred to the OPO, and in the number of patients approached and consented was identified.
Andrade J et al. <sup>85</sup>	2019	Brazil	Quantitative	To describe the experience of Santa Catarina in implementing multimodal actions to increase organ donation and their respective results	A consistent increase in the effectiveness rate of organ donation within the Santa Catarina Transplant System was reported.
De La Rosa G et al. <sup>86</sup>	2012	Spain	Quantitative	To describe the methodology of the Spanish QAPDD and to summarize the main results with the aim of promoting the development of similar approaches	Authors reported higher conversion rates in hospitals with neurosurgery compared to those without, and the results of external audit demonstrated that 6.6% of potential donors were not referred to transplant coordinators.
Heredero DP and Berzosa DL et al. <sup>38</sup>	2012	Spain	Narrative Review	To analyze from an organizational perspective the main critical success factors in the National Transplant System	Authors highlighted success factors: structured processes, team approach, external support, practice standards, shared vision.
Ehrle RN et al. <sup>79</sup>	1999	USA	Report	To discuss failure to determine which patients are potential organ donors and lack of referral of those patients to the organ procurement organization to discuss refusal of patients' families to consent to donation	Authors highlighted the role of critical care nurses in referring potential donors as key to increase referral rates, and presented ways to improve the request for donation process through the use of best practices and protocols.
English V et al. <sup>47</sup>	2019	UK	Opinion Paper	N/A	Authors in favour and against opt-out system discuss the effectiveness of such implementation to increase donation rates.
Evans RW et al. <sup>87</sup>	1992	USA	Quantitative	To estimate the potential supply of organ donors and to measure efficiency of organ procurement efforts in the United States	Efficiency varied according to different factors: donor class (trauma or other causes), social, cultural, religious/moral barriers to organ donation.
Ezaz G et al. <sup>104</sup>	2019	USA	Opinion Paper	N/A	Author discusses opt-in vs opt-out legislation and other factors that may influence donation rates (confounders to results of legislation implementation), such as religious beliefs, population composition, and predominant causes of death.
Farrall AM <sup>57</sup>	2010	UK	Narrative Review	To examine recent developments in EU governance of organ donation and transplantation focusing on analysis of the commission's action plan and the proposed Directive	The author highlights the merit in the creation of a risk regulation regimen in relation to organ donation for transplantation, but criticizes the timetable proposed to achieve the objectives and the management of ethical and risk issues.

(continued)

Table 2. (continued)

Authors	year	Country	Type	Aim	Key Findings/Topics discussed
Friele RD et al. <sup>59</sup>	2006	Netherlands	Quantitative	To explain the differences in the number of donors between hospitals	Trauma centres with academic training centre, fully implemented donor policy and a donation committee were some factors identified in high performance hospitals, but having a neurosurgery department contributed significantly to the regression model utilized.
Ghirardini A et al. <sup>88</sup>	2000	Italy	Quantitative	To apply and analyze the efficiency of the use of procurement and transplant indexes	Authors describe the use of transplant and procurement indexes as simple and yet effective in evaluating donation and transplantation activities allowing comparisons among programs in different years.
Gill JS et al. <sup>22</sup>	2008	Canada	Special Feature	N/A	Authors review the structure of the Canadian donation and transplantation system, compare Canada's performance with US and propose specific recommendations to increase deceased donation in Canada.
Hall B and Parkin MSW <sup>60</sup>	2016	UK	Narrative Review	To critically analyze policies related to organ donation by reviewing related literature, policy updates and campaigns, and the effect of those on increasing registrations and organ donation rates	Authors identified that there have been several initiatives to increase donation and registration numbers; and celebrity endorsement seemed to be most effective method to increase registration; and services and systems in hospitals need to be improved to increase successful donation.
Hong Z <sup>48</sup>	2007	Canada	Opinion Paper	N/A	Author suggests the creation of a national centre for donation and transplantation to oversee all aspects of those activities in Canada.
Hoste P et al. <sup>61</sup>	2016	Belgium	Original Article	To provide recommendations for further improvement of the deceased organ donation process up to organ procurement in Belgium	Authors identified and discussed issues in the monitoring of organ donation activities, practices and outcomes; donor pool; legislation on organ deceased organ donation; registration; financial reimbursement; educational and training programs; donor detection and practice clinical guidelines.
Howard DH et al. <sup>89</sup>	2007	USA	Quantitative	To evaluate the impact of the first phase of the Organ Donation Breakthrough Collaborative on organ donation rates	Authors identified that in the post period of analysis the conversion rate increased to 60% among collaborative hospitals and remained the same for control hospitals.
Israte MG et al. <sup>10</sup>	2015	Spain	Quantitative	To investigate the perceived benefits of Transplant Procurement Management training programs on professional competence development and career evolutions of health care workers in organ donation and transplantation	Authors report positive perceived effects of the Transplant Procurement Management training programs on performance competence development.
JCAHO <sup>68</sup>	2001	USA	N/A	N/A	Provides a checklist for guidelines to hospitals identify if their programs meet regulatory requirements for organ donation.
JCAHO <sup>44</sup>	2002	USA	N/A	N/A	Lets major steps in the process of improving organ donation programs to build a hospital culture that is supportive to organ procurement and donation.
JCAHO <sup>69</sup>	2002	USA	N/A	N/A	Addresses how hospitals can overcome common challenges in organ procurement and discusses how organ procurement organizations can help.
JCAHO <sup>39</sup>	2003	USA	N/A	N/A	Identifies best practices and effective practices to increase organ donation and begin to develop an action plan for increasing the rate of organ donation and improve safety in transplantation.
JCAHO <sup>30</sup>	2005	USA	N/A	N/A	Presents a new element of performance included in the quality standards defined by the Joint Commission.
Kong AP et al. <sup>39</sup>	2010	USA	Quantitative	To identify if the establishment of a multidisciplinary organ donor council and performance improvement initiative would improve donation outcomes	Authors reported an increase 11.9% per month in the number of potential donor referrals improvements in the conversion rates were also noted.
Kosieradzki M et al. <sup>105</sup>	2012	Poland	N/A	N/A	Authors describe increases in the donation rates after implementation of a comprehensive program (healthcare professionals training, visits to hospitals, public awareness) to improve organ donation.
Lee SD and Kim JH <sup>24</sup>	2009	South Korea	N/A	N/A	Authors discuss initiatives proposed by Korean government (broadening incentives to organ donation, development of an independent Organ Donation Organization, introduce opt-out system and improve the committee for brain death evaluation system.
Luskin RS et al. <sup>81</sup>	1999	USA	Quantitative	To assess if retrospective medical record reviews were suggested as a possible alternative measure of an OPO performance	Hospitals with more than 10 potential donors a year converted a higher percentage of potential donors with comorbidities than did hospitals with 1 to 4 donors per year.
Lynch RJ et al. <sup>32</sup>	2009	USA	Quantitative	To better understand organ procurement travel practices in the state of Michigan	The alternative travel model proposed by the authors would reduce the number of people traveling for thoracic procurements by 31%, and for abdominal procurements by 18%.
Manlylich M et al. <sup>93</sup>	2013	Spain	Opinion Paper	To improve donation rates in the selected European target areas by providing an advanced training program	Authors identified increases in the number of utilized donors and the number of organs recovered.
Martin SR <sup>49</sup>	2007	Canada	Opinion Paper	N/A	Author suggests that the creation of a national centre for donation and transplantation would be beneficial to provide infrastructure to gather statistics to track trends in donation and transplantation.
Martin-Deigado MC et al. <sup>70</sup>	2019	Spain	N/A	To report on the resulting recommendations on intensive care to facilitate organ donation (ICOD) for patients with a devastating brain injury for whom the decision has been made not to apply any medical or surgical treatment with a curative purpose on the grounds of futility	Authors highlight that end of life care can be enriched by the use of ICOD.
Martin-Loeches I et al. <sup>71</sup>	2019	Ireland	Narrative Review	To highlight key elements of an organ donation system	Authors highlighted early identification and evaluation of potential donors, donor management, key role of intensivist, the need for further research on brain dead patients, as the key elements of an organ donation system.
Martinez-Soba F et al. <sup>117</sup>	2019	Spain	Report	To analyze the impact and cost-effectiveness of setting up an Intensive Care to facilitate Organ Donation (ICOD) program	Donation rate with ICOD was higher than before its implementation.
Martinez-Soba F et al. <sup>72</sup>	2019	Spain	N/A	To report the experience with a program of intensive care to facilitate organ donation (ICOD) in 2 Spanish centres based on a common protocol	ICOD was well accepted by families, and contributed with 33% of actual donation activity in both hospitals during study period.

(continued)



**Table 2. (continued)**

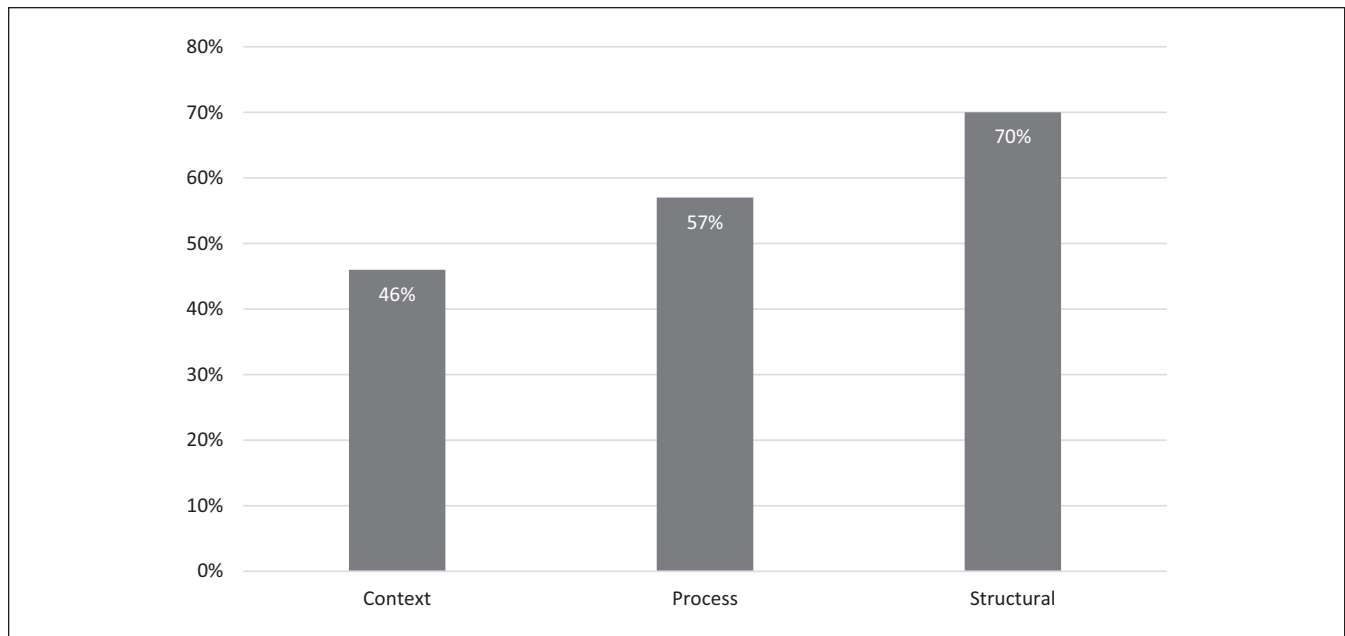
Authors	year	Country	Type	Aim	Key Findings/Topics discussed
Matesanz R <sup>12</sup>	2004	Spain	Quantitative	N/A	Highlighted factors that allow countries to replicate the Spanish model were: public national health system, economic resources, number of physicians, number of acute beds and ICU facilities, age distribution of population.
Matesanz R and Dominguez-Gil B <sup>24</sup>	2004	Spain	Opinion Paper	To define the theoretical capacity of organ procurement depending on the characteristics of the hospital To detect the obstacles in the process of organ donation and procurement To describe the hospital factors which can influence the donation and transplantation processes	Authors report that hospitals with neurosurgery had higher rates of brain deaths in the ICU mean age of brain deaths were greater in hospitals without neurosurgery and efficacy of donation process was also higher in those hospitals.
Matesanz R and Dominguez-Gil B <sup>25</sup>	2012	Spain	Quantitative	To describe the quantitative phase of a benchmarking project i.e. the methodology applied to identify procurement hospitals with the best results in the donation after brain death process	Authors identified high performance hospitals by analyzing referral of possible donors outside critical care units, management of possible donors within the ICU, and obtaining consent for organ donation.
Matesanz R et al. <sup>62</sup>	2007	Spain	Commentary	N/A	Description of main components of the Spanish model for organ donation: figure of transplant coordinator, central office to support donation activities, close attention to the media, reimbursement of hospitals.
Matesanz R et al. <sup>63</sup>	2019	Spain	Quantitative	N/A	Discusses the solely implementation of presumed consent legislation in contrast to key points to success of organ donation (infrastructure, organization around the process of deceased donation, and continuous innovation).
McNamara P et al. <sup>76</sup>	1997	USA	N/A	N/A	Authors recommend the use of medical records review to evaluate the effectiveness of the hospital organ procurement system.
Mercer L <sup>10</sup>	2012	England	Quantitative	To examine the various systems of consent for organ donation and strategies for improving organ donation rates	Addresses the effect of policy changes on organ donation, in particular regarding the organ donation taskforce recommendations.
Michael GE and O'Connor RE <sup>10</sup>	2009	USA	Quantitative	To identify factors that are associated with successful organ retrieval among patients referred to organ procurement services for potential organ donation	Patients referred for potential organ donation were more likely to become actual donors with organs retrieved if they were referred from Emergency department.
Michalopoulos A and Falagas ME <sup>26</sup>	2006	Greece	Opinion Paper	N/A	Efforts from ICU staff was identified as one ingredient to success in the organ donation program, along with the method employed for family approach to donation.
Moore R et al. <sup>53</sup>	2018	Spain	Opinion Paper	N/A	An increase in population registration to donate organs was seen after presumed consent legislation implementation
Protas J <sup>97</sup>	1985	USA	N/A	To analyze the organizational characteristics of the two kinds of organ procurement agencies in an attempt to account for their differing success rates	Independent organ procurement agencies are more effective in obtaining organs than hospital-based agencies.
Ridolfi L et al. <sup>76</sup>	2010	Italy	Quantitative	N/A	The donor action program seemed to improve procurement and transplantation activities.
Rodriguez-Arias D et al. <sup>25</sup>	2010	Spain	Opinion Paper	N/A	Authors cite legal approach, comprehensive program of education, communication, public relations, hospital reimbursement, and quality improvement as the success factors of the Spanish model.
Saab et al. S <sup>50</sup>	2018	USA	Quantitative	To assess the impact of switching to a presumed consent organ donation model on organ donation rates	Authors report an increase of liver donation rates in all 6 countries studied, and on kidney donation rates for 4 countries.
Sadegh Beigee F et al. <sup>106</sup>	2019	Iran	Quantitative	To compare consent rates before and after implementation of a strategy to engage inexperienced coordinators	Training program allowed less experienced coordinators to succeed in family approaches for organ donation.
Salim et al. A <sup>11</sup>	2007	USA	Quantitative	To evaluate the effect of the in-house coordinator program on consent and conversion rates at a centre with an aggressive management protocol already in place	Authors identified a significant increase in consent and donation rates, with 39% of increase in referral rates and 17% increase in total organs transplanted.
Salim et al. A <sup>113</sup>	2011	USA	Quantitative	To test if hospitals that implemented in-house coordinators demonstrate improved conversion rates than before the intervention	Authors identified that the implementation of in-house coordinators significantly improved organ donation outcomes.
Gois RSS et al. <sup>77</sup>	2017	Brazil	Quantitative	To verify the effectiveness of the organ donation process in the State of Parana	Authors identified an increase in the percentage of organ donations from 38.8% to 66.5%, with main barriers being family refusal, cardiopulmonary arrest, and sepsis.
Shafer TJ et al. <sup>107</sup>	1997	USA	Quantitative	To examine three successful organ procurement organizations by comparing key financial and practice indicators	Authors identified key factors of the successful OPOs: financial investment in hospital development and public education, staff investment, application of critical success factors, and leadership.
Shafer TJ et al. <sup>114</sup>	1998	USA	Quantitative	N/A	Authors identified that the investment of dedicated race-sensitive personnel to approach families resulted in a significant increase in donor conversion rates (black consent rate increased 115% and Hispanic 48%).
Shafer TJ et al. <sup>42</sup>	2006	USA	Quantitative	To describe the process used in the program and the changes in organ donation rates that accompanied these efforts	Authors reported an increase of 14.1% in donation after one year of collaborative.
Shafer TJ et al. <sup>73</sup>	2008	USA	Quantitative	To evaluate the viability of a professional specialist in intra-hospital committees of organ and tissue donation for transplantation	Authors report a steady increase in the conversion rates over the course of 2 collaborative phases from 51.5% to 65% after 2 year.
Silva VS et al. <sup>111</sup>	2015	Brazil	Quantitative	To report the results of evaluation regarding changes in the number of potential donor referrals, actual donors, and conversion rates after the implementation of an in-house organ and tissue donation coordination project	Authors identified an increase in referrals, conversion rates and in the hospital revenues. With a return on investment of 275% over a short-term period (0.36 years).
Silva VS et al. <sup>108</sup>	2016	Brazil	Quantitative	To report the results of evaluation regarding changes in the number of potential donor referrals, actual donors, and conversion rates after the implementation of an in-house organ and tissue donation coordination project	Authors identified that the implementation of the project was beneficial to improve the number of referrals and increasing conversion rates.

(continued)

Table 2. (continued)

Authors	year	Country	Type	Aim	Key Findings/Topics discussed
Stark J et al. <sup>45</sup>	1994	USA	Quantitative	N/A	Authors identified significant improvements in potential donor identification and request over prior years of the implementation of the requestor nurse program pilot.
Tocher J <sup>15</sup>	2019	UK	Discursive Paper	To explore the role that Donor Transplant Coordinators have played and the future potential of Specialist Nurses for Organ Donation within organ donation strategies in the UK and other countries	Authors highlight the central role of the organ donation coordinator and the need to further investigate the nuance elements of their practice and clinical decision-making processes supported by them.
Tordinelli M et al. <sup>116</sup>	2018	Brazil	Quantitative	To analyze donations of organs and tissues for transplants in the macroregional north of Parana	Authors identified 73% of effective donations that were possible due to proper organizational structure and trained human resources.
Anonymous <sup>35</sup>	2003	USA	Report	N/A	Authors present a set of overarching principles and best practices associated with higher rates of organ donation that were identified during the organ donation breakthrough collaborative.
Venettoni S et al. <sup>60</sup>	2003	Italy	N/A	N/A	Authors describe the success of the implementation of a model in organ procurement that includes local donation coordinators and a coordination network.
Venturoli N et al. <sup>51</sup>	2000	Italy	N/A	N/A	Authors discuss the positive results of the implementation of legislation to potentialize and coordinate organ donation activities. Potential donors increased by 84%, actual donors by 95% and multiorgan donation by 101%.
Weiss J et al. <sup>64</sup>	2018	Switzerland	Quantitative	To provide an overview of the key figures of the Swiss deceased organ donation and transplantation activity between 2008 and 2017	Authors identified a growth in donation activity (+59%) and efficiency (donor conversion index + 69%).
Whiting JF et al. <sup>109</sup>	2004	Canada	Quantitative	N/A	Authors identified the cost-effectiveness of the donation initiatives under a variety of clinical scenarios.
WHO et al. <sup>23</sup>	2011	Spain	Report	N/A	Highlights important actions to strive on self-sufficiency of organs for transplantation: acting locally, including broad public health measures, enhance cooperation among stakeholders, being carried out following WHO guiding principles and the declaration of Istanbul.
WHO et al. <sup>43</sup>	2011	Spain	Report	N/A	Working groups identified the challenges faced by Society and provided an extensive set of recommendations directed to government, international transplant organizations, and healthcare professionals to maximize organ donations to respond to patients' needs.
WHO et al. <sup>52</sup>	2011	Spain	Report	N/A	Describes different strategies towards self-sufficiency in the donation-transplantation process in various scenarios (intra and extra hospital, including government, society and legislation levels).
Wight C et al. <sup>26</sup>	2000	England	Quantitative	To describe the methodology employed by the Donor Action Program and to report results of its introduction into pilot hospitals	Authors highlight that the implementation of the donor action program can contribute up to 33% in organ donation rates sustained by 2 years.
Zavotsky KE and Tamburri LM <sup>74</sup>	2007	USA	Case Study	N/A	Authors present a case study to illustrate the 4 major strategies of the collaborative project: incorporating organ donation into the mission of the institution, quick link of potential donor families with key members of donation team, provide aggressive donor management to optimize organ function, collaboration between hospitals and organ procurement organizations

Note. ETPOD = European Training Program on Organ Donation; ICOD = intensive care to facilitate organ donation; ICU = intensive care unit; WHO = World Health Organization; OPO = organ procurement organization; DCD = organ donation after cardiocirculatory death; OPC = organ procurement coordinator; DPMP = donors per million of population; QAPDD = quality assurance program in the deceased donation process; SEUSA = the combined donation models of Spain, Europe, and USA.



**Figure 2.** Articles mentioning context, process, or structural factors.

donation across different jurisdictions increases government accountability and the quality of the organ donation program.<sup>22</sup> Therefore, a combination of national, standardized policies, coupled with appropriate program investment, contributes to successful outcomes.

**Donor profile.** In 9 papers<sup>23,43,58-63</sup> we identified this attribute, which included reports of the type of organ donor (neurological determination of death or donation after circulatory determination of death—DCD), or any information pertaining to the individual donor (ie, age, sex, race, etc). The scarcity of transplant organs often influences the transplant community to seek alternatives. Even though donation potential increases with aging populations, younger donors have higher conversion rates.<sup>58</sup> Therefore, programs that consider donation after cardiocirculatory determination of death increase the donor pool for potential organs.<sup>23,43,59-62,64,65</sup> Also, since using organs from expanded criteria donors and nonstandard risk donors contributes to the pool,<sup>43,63</sup> such use may be cautiously considered a beneficial practice.

**External support.** In 3 papers<sup>39,43,62</sup> we identified this attribute of external institutions such as ODOs, external organ and tissue donation coordinators (OTDCs), and laboratories providing organizational support to hospitals for organ donation programs and/or activities. Hospitals benefit from an external support system to manage organ donation. A central office to support the activities of organ donation such as transportation and developing the donation and transplantation process has been essential to the success of such activities especially in small hospitals lacking the capacity to

solely develop and sustain donation activities.<sup>62</sup> Centralized support is recommended by working groups of the Third Global Consultation on Organ Donation and Transplantation, organized by the World Health Organization in collaboration with the Spanish National Transplant Organization (Organización Nacional de Trasplantes) and The Transplantation Society.<sup>43</sup> The literature describes integrated donation process management as one strategy to improve donation conversion rates as ODOs providing resources for donation-related activities while receiving leadership support from the hospital.<sup>39</sup>

### Process Factors

**Communication.** We identified this attribute, which included reports of the ability to communicate effectively or not with families, the healthcare team, and ODOs, in 14 papers.<sup>25,26,39,41,44,66-74</sup> Effective communication may impact the performance of organ donation programs positively or negatively. Family interviews related to organ donation present a challenging step in the organ donation process. Trained professionals perform a smooth family interview and provide adequate information for families to make an informed decision.<sup>25,39,44,68-70,73</sup> But even trained professionals should be aware that some topics, such as talking about benefits of organ donation before familial consent and asking about patients' character traits when alive, may negatively impact family consent.<sup>66,67</sup> However, as the organ donation program in Greece illustrates, communication strategies can be used to both obtain consent and discuss the merit and importance of organ donation.<sup>26</sup>

Table 3. Attributes Identified in Retrieved Articles.

	Context				Process				Structural						
	Ethical dilemmas	Shared vision	Public policies	Donor profile	External support	Communication	Team approach	Quality improvement	Organ donation procedures	Practice standards	Specific training/education	Dedicated team on site	Structural factors	Organ donation coordination role	Institutional Policies
Adler JT et al. <sup>81</sup>				✓				✓							
Alban R et al. <sup>65</sup>							✓				✓				✓
Alonso M et al. <sup>78</sup>							✓								
Anker and Feeley <sup>66</sup>						✓									
Anker and Feeley <sup>67</sup>						✓									
Bair HA et al. <sup>36</sup>		✓					✓				✓				✓
Balleste C et al. <sup>83</sup>									✓						
Barnieh L et al. <sup>101</sup>															
Bhopal A <sup>37</sup>		✓													
Blok GA <sup>82</sup>															
Carr-Hill RA <sup>102</sup>															
Cuende N et al. <sup>58</sup>				✓											
Czerwinski J et al. <sup>103</sup>															
Das KK et al. <sup>46</sup>															
Davis BD et al. <sup>84</sup>			✓												
Andrade J et al. <sup>85</sup>															
De La Rosa G et al. <sup>86</sup>															
Herdero DP and Berzosa DL et al. <sup>38</sup>		✓													
Ehrle RN et al. <sup>79</sup>															
English V et al. <sup>47</sup>			✓												
Evans RW et al. <sup>87</sup>															
Ezaz G et al. <sup>104</sup>															
Farrell AM <sup>57</sup>															
Friele RD et al. <sup>59</sup>			✓												
Ghirardini A et al. <sup>88</sup>															
Gill JS et al. <sup>22</sup>			✓												
Hall B and Parkin MSW <sup>60</sup>			✓												
Hong Z <sup>48</sup>			✓												
Hoste P et al. <sup>61</sup>															
Howard DH et al. <sup>89</sup>															

(continued)

**Table 3. (continued)**

	Context				Process				Structural						
	Ethical dilemmas	Shared vision	Public policies	Donor profile	External support	Communication	Team approach	Quality improvement	Organ donation procedures	Practice standards	Specific training/education	Dedicated team on site	Structural factors	Organ donation coordination role	Institutional Policies
Istrate MG et al. <sup>110</sup>															✓
JCAHO <sup>68</sup>						✓		✓			✓				✓
JCAHO <sup>44</sup>		✓				✓		✓			✓				✓
JCAHO <sup>69</sup>						✓	✓	✓			✓				✓
JCAHO <sup>39</sup>		✓			✓	✓	✓	✓			✓				✓
JCAHO <sup>90</sup>						✓	✓	✓			✓				✓
Kong AP et al. <sup>99</sup>								✓			✓				✓
Kosieradzki M et al. <sup>105</sup>								0			✓				✓
Lee SD and Kim JH <sup>24</sup>	✓		✓					✓							
Luskin RS et al. <sup>91</sup>							✓	✓							
Lynch RJ et al. <sup>92</sup>							✓	✓							
Manyalich M et al. <sup>93</sup>											✓				
Martin SR <sup>49</sup>															
Martin-Delgado MC et al. <sup>70</sup>			✓			✓		✓							✓
Martin-Loeches I et al. <sup>71</sup>						✓			✓						✓
Martinez-Soba F et al. <sup>117</sup>															✓
Martinez-Soba F et al. <sup>72</sup>						✓		✓							✓
Matesanz R <sup>112</sup>												✓			✓
Matesanz R and Dominguez-Gil B <sup>94</sup>								✓				✓			✓
Matesanz R and Dominguez-Gil B <sup>95</sup>					✓			✓				✓			✓
Matesanz R et al. <sup>62</sup>				✓				✓				✓			✓
Matesanz R et al. <sup>63</sup>				✓				✓				✓			✓
McNamara P et al. <sup>96</sup>								✓				✓			✓
Mercer L <sup>40</sup>		✓	✓					✓				✓			✓
Michael GE and O'Connor RE <sup>100</sup>						✓		✓				✓			✓
Michalopoulos A and Falagas ME <sup>26</sup>	✓		✓			✓		✓				✓			✓
Moore R et al. <sup>53</sup>															
Prattas JM <sup>97</sup>															
Ridolfi L et al. <sup>76</sup>							✓	✓							✓
Rodríguez-Arias D et al. <sup>25</sup>	✓					✓		✓				✓			✓

(continued)

Table 3. (continued)

	Context				Process				Structural						
	Ethical dilemmas	Shared vision	Public policies	Donor profile	External support	Communication	Team approach	Quality improvement	Organ donation procedures	Practice standards	Specific training/education	Dedicated team on site	Structural factors	Organ donation coordination role	Institutional Policies
Saab et al. S <sup>50</sup>			✓							✓					
Sadegh Beigee F et al. <sup>106</sup>						✓								✓	
Salim et al. A <sup>41</sup>		✓								✓				✓	
Salim et al. A <sup>113</sup>										✓				✓	
Gois RSS et al. <sup>77</sup>							✓							✓	
Shafer TJ et al. <sup>107</sup>										✓				✓	
Shafer TJ et al. <sup>114</sup>							✓			✓				✓	
Shafer TJ et al. <sup>42</sup>		✓								✓				✓	
Shafer TJ et al. <sup>73</sup>						✓				✓				✓	
Silva VS et al. <sup>111</sup>										✓				✓	
Silva VS et al. <sup>108</sup>										✓		✓		✓	
Stark J et al. <sup>45</sup>		✓								✓				✓	
Tocher J <sup>115</sup>										✓				✓	
Tordinelli M et al. <sup>116</sup>										✓				✓	
Anonymous <sup>35</sup>		✓								✓				✓	
Venettoni S et al. <sup>80</sup>							✓			✓				✓	
Venturoli N et al. <sup>51</sup>							✓			✓				✓	
Weiss J et al. <sup>64</sup>										✓				✓	
Whiting JF et al. <sup>109</sup>										✓				✓	
WHO et al. <sup>23</sup>										✓				✓	
WHO et al. <sup>43</sup>		✓								✓				✓	
WHO et al. <sup>52</sup>			✓							✓				✓	
Wight C et al. <sup>98</sup>		✓								✓				✓	
Zavotsky KE and Tamburri LM <sup>74</sup>						✓				✓				✓	

Note: WHO = World Health Organization.

**Table 4.** Context, Process, or Structural Factors and Respective Attributes Represented by Success Measures.

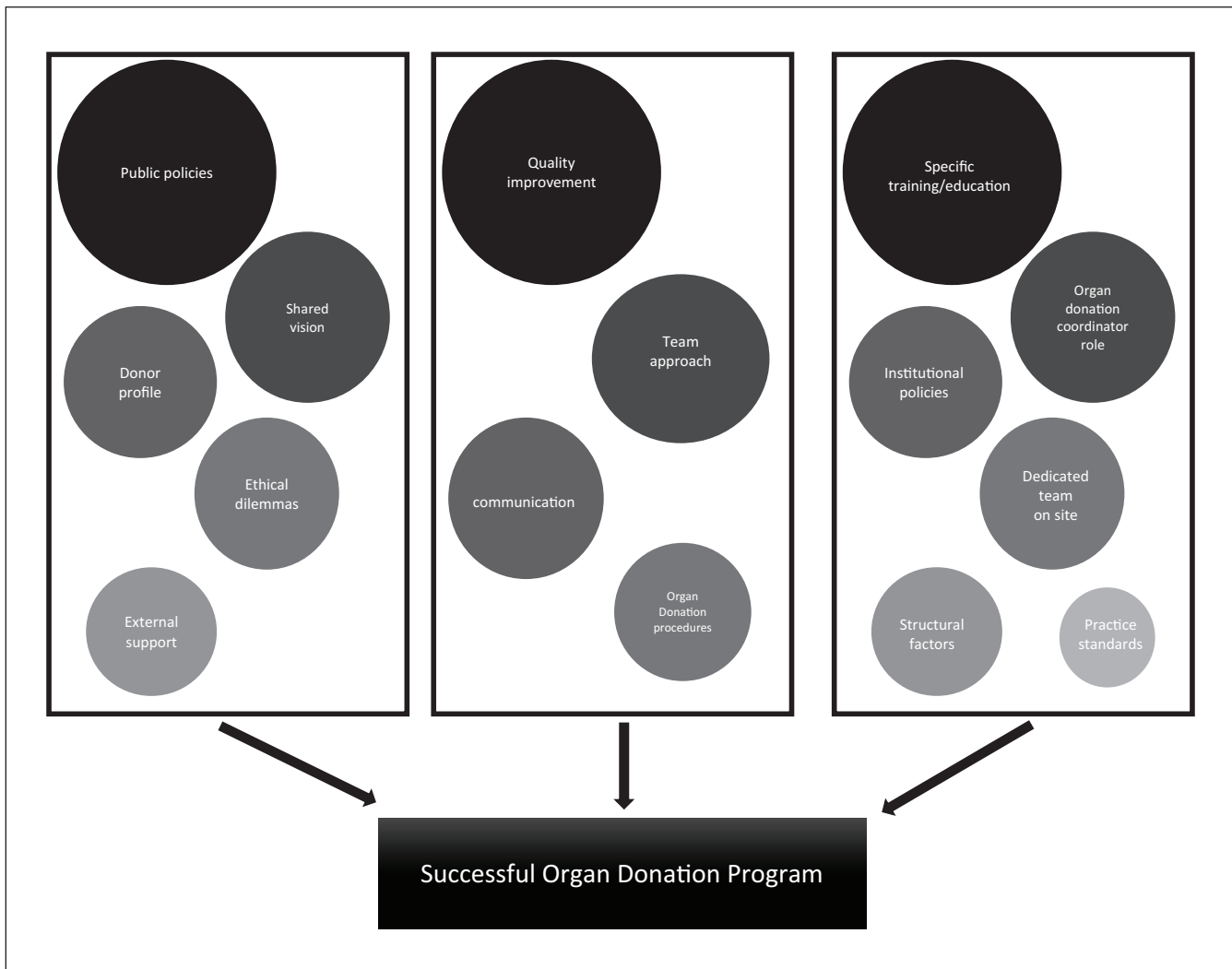
Factors	Attributes	Improvement on quality indicator numbers reported?			
		Yes		No	
		No. Studies (N=84) [n (%)]	Studies	No. Studies (N=84) [n (%)]	Studies
Context	Ethical dilemmas	1 (1)	24	4 (5)	22, 23, 25, 26
	Shared vision	4 (5)	36, 41, 42, 45	7 (8)	35, 37-40, 43, 44
	Public policies	4 (5)	24, 50, 51, 53	9 (11)	22, 40, 43, 46-49, 52, 57
	Donor profile	2 (2)	64, 65	8 (10)	23, 43, 58-63
	External support	0 (0)	N/A	3 (4)	39, 43, 62
Process	Communication	2 (2)	41, 73	12 (14)	25, 26, 39, 44, 66-72, 74
	Team approach	6 (7)	36, 42, 73, 76-78	12 (14)	26, 35, 38, 39, 44, 52, 61, 62, 71, 74, 79, 80
	Quality improvement	16 (19)	42, 64, 73, 76, 82-87, 89, 91, 94, 95, 98, 99	17 (20)	23, 35, 39, 40, 43, 44, 57, 61, 62, 68, 69, 74, 81, 88, 90, 92, 96
Structural	Organ donation procedures	4 (5)	73, 83, 84, 99	5 (6)	63, 70, 72, 74, 100
	Practice standards	0 (0)	N/A	4 (5)	38, 40, 71, 101
	Specific training/education provided	18 (21)	41, 42, 45, 64, 73, 77, 78, 82-85, 93, 99, 103, 105, 106, 108, 109	16 (19)	23, 25, 26, 35, 40, 43, 52, 57, 61, 62, 68, 69, 74, 102, 104, 110
	Dedicated team on site	7 (8)	36, 42, 45, 65, 99, 108, 111	6 (7)	40, 44, 47, 61, 69
	Structural factors	5 (6)	86, 94, 95, 98, 108	7 (8)	25, 40, 52, 57, 59, 62, 112
	Organ donation coordination role	17 (20)	36, 41, 42, 64, 73, 82, 84, 85, 94, 97, 103, 107, 108, 111, 113, 114, 116	14 (17)	23, 25, 35, 38, 40, 59-62, 74, 79, 80, 115
	Institutional Policies	9 (11)	36, 42, 73, 78, 82, 84, 108, 117	9 (11)	35, 39, 59, 61, 68, 70, 72, 74, 79

Continuous sharing of information facilitates family involvement in the process. Communication regarding the confirmation of irreversible brain injury and death is difficult. Each family needs its own time, to hear, understand, and internalize confirmation of death before proceeding with donation discussions.<sup>41,71,72</sup> After the donation, communication with family should continue through the sharing of personal matters such as important phone numbers and how to prepare for funerals and empathetic documents such as a sympathy letter and a nondenominational bereavement poem sent to donor families.<sup>74</sup> We should also highlight a report of recommendations of leading practices in offering the opportunity for organ donation that was not yielded in our search strategy, but that supports the importance of effective communication during end-of-life conversations.<sup>75</sup> Examples of recommendations included effective conversations with families by using collaborative, compassionate, and supporting approach, and providing meaningful information regarding donation and its value; planning family conversations in a team huddle with members of healthcare team beforehand; communicating grave diagnosis or death prior and separate from conversations about donation; ensuring informed decisions of families; using confident and positive approach rather than a guarded apologetic approach; sensitively discussing reasons for refusals; supporting families during all steps of the donation process and postdonation.<sup>75</sup>

**Team approach.** In 17 papers<sup>26,35,36,38,39,42,52,61,62,71,74,76-80</sup> we identified this attribute that included the involvement of

intensive care unit (ICU) teams and organ donation coordinators in the donation process. Ongoing collaboration among hospital and ODO staff is considered key to the success of various donation programs.<sup>36,62,69,76</sup> Increasing the rates of staff involvement with organ donation procedures,<sup>26,42,52</sup> as well as having a multidisciplinary team involved seems to be an important step toward increasing organ donation rates.<sup>78</sup> That is because early referral was identified as essential to successful organ donation processes,<sup>39</sup> and low donor identification, or referral rates, or lack of donor referral are the main barriers organ donation programs face.<sup>61,79</sup> Studies recognized the importance of donor coordinators defining and maintaining a network of interpersonal relationships with various individuals at the hospital level.<sup>35,42,74</sup> Performance of organ donation programs depends on effective communication and a working relationship between the organ donor coordinator and hospital staff for joint and shared work.<sup>71,80</sup> Ideally, a horizontal relationship working jointly toward improving the donation process should recognize the value of each team member's contribution, integrate activities, and give staff responsibilities and autonomy in decision-making.<sup>38,77</sup>

**Quality improvement.** We identified this attribute, which included any initiatives hospitals and ODOs and programs implement to increase quality in organ donation processes, in 34 papers.<sup>23,35,36,39,40,42-44,57,61,62,64,69,73,74,76,81-98</sup> Initiatives that improve quality and safety include using internal and/or external audits of organ donation activities and quality



**Figure 3.** Concept map.

Note. There is no single path to success in organ donation programs. Therefore, the figure represents the factors of successful organ donation programs found in the literature search. The size of the bubbles depicts the number of articles mentioning the concept's positive influence in organ donation activities. Some concepts are interrelated between factors and represent a joint influence in organ donation programs.

indicators to measure program performance to identify improvement opportunities in the donation processes,<sup>61,62,83,86</sup> and establishing a structured quality improvement/assurance program that incorporates audits and evaluates program performance through various methods such as death record reviews, outcomes review (analysis of quality indicators), and efficiency indexes.<sup>23,35,39,40,42-44,57,61,64,68,69,73,74,76,81,85,86,88,91,94,96,98,99</sup> Implementing collaborative programs<sup>84,89</sup> or benchmarking methods,<sup>95</sup> to discharge interventions associated with higher levels of performance in high-performing ODOs, improved efficiency.<sup>92</sup> In addition, a comprehensive and standardized approach to quality and safety in organ donation and transplantation was highlighted as a key factor in overcoming the challenge of increasing organ availability worldwide, including adequate donor management

throughout donation process steps.<sup>23</sup> Conversion rates have been used as measures of efficiency of donation programs,<sup>87</sup> but the inclusion of other measures of success, such as the satisfaction of donor relatives about the treatment received during the donation process, should be considered.<sup>82</sup> Including patient partners in research, as well as clinicians and OTDCs, would support a more thorough investigation as it would bring knowledge users and researchers together to discuss their practice needs, research methods development, and interpretation of results.

*Organ donation procedures.* We identified this attribute, which included any recommendations or actions within the context of the role of OTDCs in acute care settings in any part or the whole deceased organ donation process, in 8 papers.<sup>23,61,63,66,67,73,74,83,84,94,99,100</sup> One action, to implement



interventions in organ donation procedures to improve referral rates, is to use an electronic system to report potential donors to organ donation coordinators in the early stages of a case.<sup>83</sup> Another tool used in the USA is the use of clinical triggers (physiologic and anatomic criteria) to allow easier and timely identification of organ donors by ICU staff.<sup>84</sup> In addition, a review system to evaluate all aspects of the donation process (family approach, donor maintenance, and acceptance of organs for transplantation) was shown to improve timely notification rates.<sup>99</sup> Improving notification rates is one of the key strategies in Spain's successful donation rates. Equally important is incorporating discussions about organ donation in the context of end-of-life care.<sup>63,100</sup> Also highlighted, early referral should be implemented in low performer hospitals to increase donation rates in the USA,<sup>73</sup> as well as early linkage of potential donor families with organ donation coordinators.<sup>73,74</sup>

### **Structural Factors**

**Practice standards.** We identified this attribute, which included any description of standardized organ donation practices, evaluation, and measurements, in 8 papers.<sup>23,25,38,40,63,71,85,101</sup> Literature highlighted the importance of standardized measures to evaluate a program's effectiveness. Population demographics may influence the crude measure of donor per million of population, and the definition of effective donors varies worldwide.<sup>101</sup> If not standardized worldwide, that variation in organ donation practices and measurements might inflate or underestimate a program's performance. As an example, some organ donation programs consider as effective donors those with organs retrieved but not necessarily transplanted, whereas other programs consider that measure only if at least one organ was transplanted.<sup>101</sup>

Standardization of organ donation practices is also one of the factors that may influence the excellence of organ donation programs. Proper assignment of tasks and procedures allows individuals involved in the donation processes to anticipate potential deviances from the normal processes with timely communication to the OTDC to rapidly respond with solutions to correct the deviations.<sup>38</sup> Besides, guidelines outlining clinical triggers for donor referral<sup>40</sup> and goal-directed checklists have been reported as important tools to decrease donor loss.<sup>71</sup> Finally, developing a common accreditation system for organ donation and transplantation programs provides minimum quality and safety requirements such as traceability of organs and reporting of adverse events.<sup>23</sup>

**Specific training and/or education.** We identified the attribute of either formal academic or professional training for OTDCs or healthcare professional involved in the organ donation processes in 35 papers.<sup>23,25,35,40-43,47,52,57,61,62,64,65,69,73,74,77,78,82-85,93,99,102-109</sup> Successful outcomes in organ donation programs depend

on ensuring that involved individuals are well-informed. Training programs are cost-effective<sup>109</sup> and have positive perceived effects on healthcare professionals' practices.<sup>110</sup> While educating employees allows them to recognize and refer possible donors earlier in the process<sup>45,52,74</sup> and facilitate steps,<sup>52</sup> training programs should be adapted to each level, that is, basic knowledge to hospital staff, in-depth training to donation coordinators.<sup>23,25,57,62,64,73,78,83-85,99,103,104,108</sup> Furthermore, specific training (ie, on effective and empathetic communication with donor relatives) boosts the number of consent rates and organ donors,<sup>61,77,82,93,102,105,106,109</sup> donor relatives' satisfaction with the donation process,<sup>82</sup> and is recommended as one key strategy to improve donation numbers.<sup>40,68,69</sup> Specific training inspires hospital staff to become committed to the organ donation cause and increase conversion rates.<sup>26</sup> Thus, training sessions should be offered at least every 1 to 2 years,<sup>35,41,42,103</sup> or yearly (ie, during organ donation awareness month)<sup>74</sup> to ensure their effectiveness. There is also a need for public education through school curricula and health professional schools to increase awareness.<sup>43</sup>

**Dedicated team on site.** In 15 papers we identified the attribute of dedicated team on site, meaning having hospital staff either nominated as support personnel to organ donation cases or who volunteer into this role in addition to their usual activities.<sup>24,35,36,40-42,45,47,65,77,84,99,108,111</sup> Studies highlighted the formalization of a team of ICU healthcare providers to support organ donation as contributing to increased donation rates. The role of "donation champions" or "certified nurse requestors" contributes to improve conversion rates,<sup>36,40,42,45,47,65</sup> donation rates,<sup>84</sup> and organ donation programs in general.<sup>35,44</sup> In addition, studies report that implementing organ donation committees contributes to increasing donation rates.<sup>61,85,99,108,111</sup> One study suggested identifying and utilizing the strengths and experiences of critical care and intensive care staff usually passionate about organ donation to improve compliance in other areas such as emergency departments.<sup>69</sup>

**Structural factors.** We identified this attribute, which includes factors embedded in the physical, economic, or organizational structures of hospitals and organ donation programs, in 15 papers.<sup>23,25,40,43,57,59,60,62,83,86,94,95,98,108,112</sup> A structured donation program reduces costs and maximizes organ donations.<sup>23,109</sup> The development of a donation committee may help increase hospital staff support to organ donation.<sup>98</sup> Successfully implementing a deceased organ donation program includes establishing dedicated human resources to organ donation activities<sup>40,83</sup> and a central administrative agency to coordinate and support all processes of organ donation (ie, an ODO).<sup>40,57</sup> Ideally, adequate reimbursement of hospitals' procurement and transplant activities<sup>25,62,108,112</sup> and overall financing of organ donation programs<sup>52</sup> should be provided. Hospital characteristics, such as having a neurosurgery

department,<sup>59,62,86,94,95,112</sup> availability of ICU beds,<sup>62,94,95,112</sup> computerized tomography,<sup>62,94,95,112</sup> concentration of population,<sup>62,94,95,112</sup> and number of nurses and physicians per acute care bed<sup>25,62,94,95,112</sup> were identified as positively influencing the number of organ donors.

**OTDC role.** We defined the OTDC role as a trained professional dedicated to managing the entirety of the organ donation process, represented either in the role of the OTDC or a transplant coordinator, an attribute we identified in 32 papers.<sup>23,25,35,36,38,40-42,57,59-62,64,68,73,74,79,80,82,84,85,94,97,103,107,108,111,113-116</sup> Five articles mentioned physicians filling the role,<sup>57,61,62,80,94</sup> and 10 in which nurses did,<sup>40,41,60,61,108,111,113-116</sup> but 18 articles did not specify the coordinator's profession.<sup>23,25,35,36,38,42,59,64,68,73,74,79,82,84,85,97,103,107</sup> Leadership is key in organ donation success. The role of a full-time transplant coordinator benefits organ donation rates' increase<sup>41,42,57,59,62,73,74,80,84,94,97,107,108,111,113-115</sup> because the coordinator's expertise in liaising between hospital staff and ODOs<sup>36</sup> allows early identification of potential organ donors<sup>25</sup> and increases the quality and safety of organs retrieved.<sup>61</sup> In addition, not only are families more satisfied with the donation process in the presence of an OTDC,<sup>82</sup> but also studies support and recommend the role.<sup>23,40,103</sup> Therefore, studies advocate appropriate remuneration of transplant coordinators' work particularly in some programs where coordinators work voluntarily in parallel with other roles in the hospital such as ICU nurse.<sup>64,85</sup> Ideally, OTDCs should have critical care training and knowledge of donation and transplantation processes, as that allows better management of the donation process<sup>38</sup> and increased rates of success for donation requests.<sup>35,60,79,116</sup>

**Institutional policies.** In 19 papers we identified this attribute as (1) documenting the specifics of operationalization of organ donation processes in institutional policies, and (2) describing the roles, responsibilities, steps of organ donation, and processes to have access to specific laboratory or image exams, etc.<sup>35,36,39,42,57,59,61,68,70,72-74,78,79,82,84,99,108,117</sup> Reports indicated implementing guidelines and policies to describe the different parts of the donation process (including DCD policies) as one of the solutions to overcome challenges such as low rates of staff involvement in donation procedures, low donor identification rates, in-hospital organizational problems,<sup>78</sup> improvement of organ donation rates,<sup>35,36,59,73,84</sup> and family satisfaction with the donation process.<sup>82</sup> Examples of protocols include the description of procedures for timely referral of potential donors,<sup>39,61,68,70,72</sup> processes to inform potential donors' families about the option to donate,<sup>39,61,68,72</sup> description of intensive care measures for organ donor maintenance,<sup>39,61,68,72,74,108,117</sup> and management of DCD donors.<sup>99</sup> In addition, studies noted that implementing practice protocols for requesting consent for organ donation enhanced the sensitivity and effectiveness of the organ donation and procurement process.<sup>42,79</sup>

## Limitations

Limitations of this scoping review include the possible omission of evidence in languages other than English, Portuguese, and Spanish and the focus on breadth rather than depth of evidence. Therefore, consistent with scoping review methodology, the methodological quality of included studies was not assessed. Even though this method was appropriate for this review, given our objective of mapping the evidence on indicators related to organ donation success, the search strategy employed may have omitted evidence. The results of this scoping review have identified the multi-factorial nature of the processes and structures within the organ donation process.

## Conclusions

This scoping review did not identify a single path to success in organ donation programs, but did identify a number of processes as well as structural and contextual factors that contribute to the success of such programs. However, studies examined those factors independently not accounting to the potential association between them to the performance of organ donation programs demonstrating an important gap in the literature. Therefore, further research is needed to holistically identify and measure attributes associated with successful organ donation programs. We recommend wide reporting of primary research, including in peer-reviewed journals, investigating the combination of factors described in this scoping review and the performance of organ donation programs in terms of quality indicators including aspects such as family satisfaction with the process. That would enable performance of systematic reviews, development of evidence-based protocols for clinical guidance, and implementation of behavioural interventions in organ donation teams to improve process quality.

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Ethics approval and consent to participate was not required for this publication.

## Consent for Publication

All authors have given their consent for publication of this article.

## Availability of Data and Materials

Data or materials are not available for this article.

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