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Knowledge and perceptions of donation after circulatory death among nurses: a multicentre survey in Northern Italy

Conoscenze e percezioni relative alla donazione dopo arresto cardiocircolatorio tra il personale infermieristico: un'indagine multicentrica nel Nord Italia

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ABSTRACT

Introduction: donation after Circulatory Death (DCD) has become an increasingly important strategy for expanding the donor pool and addressing the persistent shortage of organs available for transplantation. Nurses play a key role throughout the donation process; however, evidence regarding their knowledge of DCD in Italian healthcare settings remains limited.
Materials and Methods: a multicentre cross-sectional survey was conducted between June and July 2024 among registered nurses working in three hospitals in Northern Italy. An adapted version of a previously published questionnaire was used to assess knowledge and perceptions regarding DCD. Data were analysed using descriptive statistics.
Results: a total of 113 nurses participated in the study. Nearly two-thirds (64.6%) reported previous exposure to organ or tissue donation pathways, whereas only 20.4% had received specific education on DCD. Most participants recognised that tissue donation (92.0%) and solid organ donation (79.6%) may be possible following circulatory arrest. However, important knowledge gaps emerged regarding death determination criteria (41.6%), donor classification systems (16.8%), and the implications of the no-touch period (17.7%).
Conclusions: nurses demonstrated general awareness of DCD but limited knowledge in several procedure-specific areas. Structured educational initiatives addressing both technical and ethical aspects of DCD may improve preparedness and support the implementation of DCD programmes in clinical practice.

Key words: tissue and organ procurement, organ donation, transplantation, nurses, knowledge, education, nursing.

RIASSUNTO

Introduzione: la donazione dopo morte circolatoria (Donation after Circulatory Death, DCD) è diventata una strategia sempre più importante per ampliare il bacino dei donatori e far fronte alla persistente carenza di organi disponibili per il trapianto. Gli infermieri svolgono un ruolo fondamentale durante l'intero processo di donazione; tuttavia, le evidenze relative alle loro conoscenze in materia di DCD nelle strutture sanitarie italiane rimangono limitate.
Materiali e Metodi: tra giugno e luglio 2024 è stata condotta un'indagine trasversale multicentrica tra infermieri abilitati che lavorano in tre ospedali del Nord Italia. È stata utilizzata una versione adattata di un questionario precedentemente pubblicato per valutare le conoscenze e le percezioni relative alla DCD. I dati sono stati analizzati utilizzando statistiche descrittive.
Risultati: allo studio hanno partecipato in totale 113 infermieri. Quasi due terzi (64,6%) hanno riferito di aver già avuto a che fare con i percorsi di donazione di organi o tessuti, mentre solo il 20,4% aveva ricevuto una formazione specifica sulla DCD. La maggior parte dei partecipanti ha riconosciuto che la donazione di tessuti (92,0%) e quella di organi solidi (79,6%) possono essere possibili in seguito a un arresto circolatorio. Tuttavia, sono emerse importanti lacune conoscitive riguardo ai criteri di accertamento del decesso (41,6%), ai sistemi di classificazione dei donatori (16,8%) e alle implicazioni del periodo di non intervento (17,7%).
Conclusioni: gli infermieri hanno dimostrato una consapevolezza generale della DCD, ma una conoscenza limitata in diverse aree specifiche relative alle procedure. Iniziative formative strutturate che affrontino sia gli aspetti tecnici che quelli etici della DCD potrebbero migliorare la preparazione e sostenere l'attuazione dei programmi di DCD nella pratica clinica.

Parole chiave: prelievo di tessuti e organi, donazione di organi, trapianto, infermieri, conoscenza, formazione, assistenza infermieristica.

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Introduction

Donation after Circulatory Death (DCD) has become an increasingly important strategy for expanding the pool of organs available for transplantation and addressing the persistent shortage of donors worldwide.[1,2] In Italy, the progressive implementation of DCD programmes has introduced new clinical, organisational, and ethical challenges, requiring healthcare professionals to develop specific competencies related to donor identification, end-of-life care, death determination, and donation pathways.[2,3]

Nurses play a pivotal role throughout the DCD process. Their responsibilities include the clinical management of potential donors, collaboration with multidisciplinary teams, communication with families, and support of donation procedures.[3,4] Consequently, adequate knowledge and understanding of DCD principles are essential to ensure the quality, safety, and ethical integrity of the donation process.

Previous studies have reported variability in healthcare professionals' knowledge and preparedness regarding organ donation and DCD, highlighting the need for targeted educational initiatives and continuing professional development.[4-9] Recent evidence from Sweden has further shown that intensive care nurses frequently report limited knowledge of DCD and identify educational and ethical support needs during the implementation of DCD programmes.[10,11] Despite the growing adoption of DCD pathways across Europe, evidence describing nurses' knowledge of DCD in Italian hospital settings remains limited.

Therefore, this cross-sectional survey aimed to describe nurses' knowledge and perceptions regarding donation after circulatory death in three Italian hospitals and to identify potential areas for educational improvement to support the implementation of DCD programmes.

Materials and Methods

Study design

A cross-sectional observational study was conducted between June and July 2024 as part of an undergraduate Nursing Degree thesis at the University of Milan. The study involved registered nurses working in three hospitals in the Lombardy Region, Italy: ASST Crema – Ospedale Maggiore, ASST Bergamo Ovest – Ospedale di Treviglio-Caravaggio, and IRCCS Centro Cardiologico Monzino. Nurses working in mental health, maternal–child health, and home care services were excluded to ensure consistency with the study objectives, which focused on hospital settings potentially involved in organ donation pathways.

Participants

Registered nurses employed in the participating hospital wards were invited to participate voluntarily and anonymously. No personally identifiable information was collected. Before accessing the questionnaire, participants received information regarding the study aims and provided electronic informed consent.

Survey instrument

Data were collected using a questionnaire adapted, with permission from the original authors, from the instrument developed by Caratelli *et al*.[9] The original questionnaire, described by its authors as a non-standardized instrument, was designed to investigate nurses' knowledge, experiences, and perceptions regarding organ and tissue donation, with particular focus on DCD. The original questionnaire had not undergone formal psychometric testing or validation.

The adapted questionnaire retained the original structure and consisted of 19 multiple-choice items organized into two sections. The first section (items 1–8) collected socio-demographic and professional characteristics, whereas the second section (items 9–19) explored participants' knowledge and perceptions regarding organ donation and DCD.

Only minor modifications were introduced to improve terminology and adapt the questionnaire to the local context without altering the constructs investigated. Specifically, the term Non-Heart-Beating Donor (NHBD) was replaced with the currently adopted terminology DCD; one item was replaced with an open-ended question aimed at collecting descriptive information regarding previous DCD-related educational activities; and the socio-demographic section was adapted to the characteristics of the study population.

Before dissemination, the adapted questionnaire underwent a preliminary face-validity assessment in a small group of registered nurses to evaluate clarity and comprehensibility. Feedback resulted only in minor wording refinements before the final version was distributed. Since the modifications did not alter the conceptual framework of the original instrument, no additional psychometric validation or reliability testing was performed.

Data collection

The questionnaire was administered through Google Forms using a web link and QR code distributed within the participating hospitals. The introductory page explained the study objectives, guaranteed anonymity, and included the informed consent statement. Before data collection, authorization to conduct the study and distribute the questionnaire was obtained from the management of the participating healthcare institutions.

Statistical analysis

Data were exported to Microsoft Excel and analysed using IBM SPSS Statistics. Categorical variables were summarized as absolute frequencies and percentages. The questionnaire did not generate an overall knowledge score. Each item was analysed individually, and responses were summarized using frequencies and percentages. Comparisons between the Lombardy sample and the national study by Caratelli *et al.*[7] were performed using Pearson's chi-square test for comparable questionnaire items, with statistical significance set at $p < 0.05$.

Considering the substantial differences in sample size, geographical distribution, and organizational context between the two study populations, comparative analyses were interpreted as exploratory and descriptive rather than intended to support population-level inference.

Ethical considerations

The study consisted of an anonymous, voluntary questionnaire survey and did not involve the collection of personally identifiable or sensitive data. According to applicable national regulations and institutional procedures, formal Ethics Committee approval was not required for this type of study. Participation was voluntary, and electronic informed consent was obtained from all participants before completion of the questionnaire.

Results

A total of 113 nurses participated in the survey. Nearly two-

thirds of respondents (64.6%) reported previous exposure to organ or tissue donation pathways during their professional activity, whereas only 20.4% had received specific education on DCD (Table 1).

Participants' perceptions regarding DCD were generally favourable. Most respondents recognised that tissue donation (92.0%) and solid organ donation (79.6%) may be possible following circulatory arrest. In addition, 87.6% were aware that donation pathways can be activated after cardiac arrest under specific circumstances. These findings suggest a generally positive perception of the feasibility of DCD among participating nurses.

Despite this general awareness, relevant knowledge gaps emerged in several DCD-specific domains. Only 41.6% correctly identified the circulatory criteria used for death determination, 16.8% correctly recognised donor classification systems, and 17.7% correctly understood the implications of the no-touch period. Knowledge of DCD operational procedures was reported by 71.7% of respondents.

Overall, the findings suggest that nurses were generally familiar with the concept and potential of DCD and expressed favourable perceptions towards donation after circulatory death. However, important deficiencies remained regarding specific procedural, regulatory, and clinical aspects of the donation pathway (Table 1).

Discussion

This study explored nurses' knowledge and perceptions regarding donation after circulatory death (DCD) in three hospitals in the Lombardy Region and compared the findings, from an exploratory perspective, with those reported by Caratelli *et al.*[7] Although the two studies differed substantially in sample size, geographical distribution, and organizational context, the comparison provides useful insights into areas of consistency and variability that may help identify educational priorities and organizational needs.

Overall, the findings indicate that nurses demonstrated an adequate understanding of general concepts related to organ donation, whereas greater uncertainty emerged regarding DCD-specific issues, particularly the cardiocirculatory criteria for death determination, donor eligibility following cardiac arrest, and the clinical implications of the no-touch period. These findings are consistent with previous studies reporting that healthcare professionals generally possess satisfactory knowledge of organ donation but continue to show important gaps in the organizational, ethical, and clinical aspects specific to DCD.[3,10,11] Recent qualitative evidence has further shown that nurses involved in DCD identify educational needs, ethical challenges, and communication with families as key issues requiring structured institutional support, reinforcing the importance of comprehensive educational programmes for professionals involved in donation pathways.[12]

Direct experience with organ donation during routine clinical practice was more frequently reported in the Lombardy sample than in the national cohort described by Caratelli *et al.*[7] However, greater clinical exposure did not consistently correspond to higher levels of theoretical knowledge across all DCD-related domains. This finding suggests that practical experience alone may be insufficient to ensure an adequate understanding of the principles underlying DCD and highlights the importance of integrating structured educational initiatives with clinical experience.

The differences observed between the two study populations should be interpreted cautiously. They may reflect differences in organizational context, educational opportunities, and exposure to donation pathways rather than true differences in professional competence. Because the present study was not designed to investigate these factors directly, no causal relationship can be established. Nevertheless, these contextual factors should be considered when interpreting the findings and may partly explain the variability observed across different healthcare settings. Furthermore, the participating hospitals had different levels of experience with organ donation pathways, which may also have influenced nurses' baseline knowledge and familiarity with DCD-related procedures.

From an educational perspective, the results support the implementation of structured training programmes specifically focused on DCD. Educational interventions should extend beyond traditional lectures and include simulation-based training, multidisciplinary educational activities, clinical audit, and regular refresher courses to improve both theoretical knowledge and preparedness for clinical practice. These findings are consistent with previous evidence suggesting that educational programmes should encompass not only technical competencies but also ethical decision-making and communication with families involved in the donation process.[6,11,12] Strengthening educational pathways may contribute to greater consistency in DCD management, improve nurses' confidence when participating in donation pathways, and facilitate the implementation of DCD programmes across different healthcare settings.

Table 1. Professional characteristics, knowledge and perceptions regarding Donation after Circulatory Death (DCD) among nurses (N=113).

Variable	n (%)
Professional characteristics	
Previous exposure to organ/tissue donation pathways	73 (64.6)
Previous DCD training	23 (20.4)
Perceptions regarding DCD	
Perception that organ donation may be possible after circulatory arrest	99 (87.6)
Perception that tissue donation may be possible after circulatory arrest	104 (92.0)
Perception that solid organ donation may be possible after circulatory arrest	90 (79.6)
Knowledge regarding DCD	
Correct identification of circulatory criteria for death determination	47 (41.6)
Correct understanding of donor classification systems	19 (16.8)
Correct understanding of the impact of the no-touch period	20 (17.7)
Knowledge of DCD operational procedures	81 (71.7)

DCD, Donation after Circulatory Death. Percentages are calculated on the total sample (N = 113).

The findings also highlight the need for greater standardization of educational content concerning DCD, particularly regarding the criteria for death determination, donor selection, classification systems, and operational procedures. Addressing these knowledge gaps may improve nurses' confidence, promote more consistent clinical decision-making, and ultimately support the quality, safety, and ethical integrity of the donation process.

Limitations

This study has several limitations. First, the comparison with the national study by Caratelli *et al.*[7] was exploratory and involved two studies conducted in different periods and organizational settings, with substantially different sample sizes. Therefore, the findings cannot be generalized to the wider nursing population, nor can causal relationships be inferred. Second, the questionnaire was adapted from a previously published non-standardized instrument. Although only minor modifications were introduced and face validity was assessed before administration, the exact number of nurses involved in the preliminary face validity assessment was not recorded. Furthermore, no formal psychometric validation or reliability testing was performed in the present study. Third, participation was voluntary and anonymous, which may have introduced selection bias, as nurses with greater interest in or previous exposure to organ donation pathways may have been more likely to participate. Finally, the study was conducted in three hospitals within a single Italian region, limiting the transferability of the findings to other healthcare settings.

Despite these limitations, this study provides valuable preliminary evidence on nurses' knowledge and perceptions regarding DCD within Italian hospital settings. The findings identify specific educational gaps that may inform the development of targeted training programmes and support future multicentre studies aimed at strengthening nurses' preparedness for donation after circulatory death.

Conclusions

The present study identified both strengths and educational needs in nurses' preparedness regarding donation after circulatory death. Although participants demonstrated satisfactory knowledge of general organ donation principles, important uncertainties remained regarding DCD-specific clinical, organizational, and ethical aspects. These findings support the development of structured and standardized educational programmes aimed at strengthening nurses' competence and confidence in managing DCD pathways. Future multicentre studies involving larger and more heterogeneous populations are warranted to evaluate the impact of educational interventions and organizational factors on nurses' preparedness for donation after circulatory death.

References

1. Kootstra G. Statement on non-heart-beating donor programs. Transplant Proc 1995;27:2965.
2. Italian National Transplant Centre. Consensus statement on controlled donation after circulatory death procedures in Italy: position paper and national guidance document [Internet]. Rome: Italian National Transplant Centre; 2023 [cited 2026 Jun 14]. Available from: https://www.trapianti.salute.gov.it
3. Giubbilo I. Organ donation after determination of death by circulatory criteria: ethical and clinical challenges for critical care nurses. Scenario 2021;38:43–47.
4. Jawoniyi OO, Gormley K. How critical care nurses' roles and education affect organ donation. Br J Nurs 2015;24:698–700.
5. Kondori J, Ghafouri RR, Zamanzadeh V, Attari A, et al. Emergency medical staffs' knowledge and attitude about organ donation after circulatory determined death (DCD) and its related factors. BMC Emerg Med 2021;21:91.
6. Araujo CAS, Siqueira MM. The effect of educational initiatives on the attitude and knowledge of health care professionals regarding organ donation and transplantation: an integrative literature review. Transplant Proc 2023;55:13–21.
7. Caratelli A, Bartalini Bigi C, Delle Donne G, et al. Procurement from non-heart-beating donor, a path under construction: a descriptive observational study on Italian nurses' knowledge. Scenario 2023;40:538.
8. Shahsavarinia K, Tagizadieh A, Pouraghaei M, et al. Assessment of attitude and knowledge of personnel in the intensive care unit toward organ donation. Transplant Proc 2016;48:2577–81.
9. Mathur M, Taylor S, Tiras K, et al. Pediatric critical care nurses' perceptions, knowledge, and attitudes regarding organ donation after cardiac death. Pediatr Crit Care Med 2008;9:261–9.
10. Murphy N, Weijer C, Smith M, et al. Controlled donation after circulatory determination of death: a scoping review of ethical issues, key concepts, and arguments. J Law Med Ethics 2021;49:418-40.
11. Gripewall E, Fagerström L, Kumlien C, et al. Swedish intensive care nurses' knowledge, attitudes, and views on donation after circulatory death before a national implementation. SAGE Open Nurs 2024;10:23779608241274208.
12. Křivková J, Šimek J, Cassar M, Leden P, et al. Intensive care nurses' attitudes toward organ and tissue donation after circulatory death: qualitative study. Prog Transplant 2026; doi:10.1177/10784535261419507

Contributions: Lorenzo Righi, conceptualization, including formulation of the research objectives and coordination of the research team; writing – review & editing, including critical revision of the manuscript and methodological supervision; Vittorio Uggè, data curation, including data management, dataset organization, and support for statistical analysis; writing – original draft, including preparation of the first manuscript draft and results sections; Alessio Caratelli, methodology, including study design and adaptation of the survey instrument; writing – review & editing, including contributions to the methodological sections and overall manuscript coherence; Giulia Martinenghi, investigation, including data collection across participating centres and contribution to the development of table and the materials and methods section; Christian Ramacciani Isemann, supervision, including overall study coordination and validation of scientific content; writing – review & editing, including critical manuscript revision and quality assurance of the study. All authors read and approved the final version of the manuscript.

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Ethical principles: the study was conducted in full accordance with the ethical principles outlined in the Declaration of Helsinki of 1964 and its subsequent amendments, including the 2013 revision. Participation was voluntary and anonymous. Completion of the questionnaire was considered as implied informed consent. Respondent anonymity and data confidentiality were fully ensured throughout the study.

Availability of data and materials: all data collected and analyzed during the study are presented within the article. Additional information or supplementary materials may be made available by the authors upon reasonable request, in compliance with data protection regulations.

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