

OPEN

Practice and Attitudes of Donor Coordinator Roles Regarding Physical Examination of Potential Organ and Tissue Donors in Australia

Justine A.C. Holloway, RN,¹ Kristen Ranse, RN, PhD,² Kasia Bail, RN, PhD,¹ Maggie Jamieson, PhD,^{3,4} and Frank Van Haren, MD, PhD, EDIC, FCICM^{5,6,7}

Background. Physical examination of potential organ and tissue donors is standard practice to mitigate risks and optimize outcomes for transplant recipients, but the content and process of the examination has not been investigated. The aim of this study was to determine current practice of performing a physical examination on potential organ and tissue donors in Australia. **Methods.** An online cross-sectional survey was circulated to all Australian Donor Coordinators (n = 125). **Results.** There were 75 responses (60% response rate) to the online survey. Respondents perform a mean 10.5 physical examinations per year. Inconsistencies were observed in the approach to the physical examination, inclusive of assessment techniques used to perform the examination such as palpation. Specific staff training and education to perform the examination was reportedly provided to 77% of respondents. There was less variation reported in examination findings classified as higher risk and escalation procedures with the 3 most common findings of injection sites / track marks (86%), suspicious moles (77%), and unexplained scarring (51%), and with 97% seeking a second opinion. Current and previously removed melanomas were the main examination findings that stopped a donation from proceeding, as reported to have occurred by 18 respondents. **Conclusions.** This study has identified variations in current physical examination practice and provided the evidence to pursue practice improvement. The inconsistencies can be partly attributed to discrepancies in training and education of staff and no standardized national guidelines to clearly outline expected practice.

(*Transplantation Direct* 2019;5: e471; doi: 10.1097/TXD.0000000000000906. Published online 23 July, 2019.)

Successful transplant recipient outcomes are the goal of organ donation, which is a recognized treatment option for people with organ failure. Yet, the supply of donated organs does not meet the demand for the number of people who are waiting for a transplant. In Australia, in 2017, there were 510 organ donors and 364 tissue donors, yet at any given time, there are 1400 people waiting for a transplant.¹ Due to the specific clinical circumstances that must occur, <2% of people

who die in the hospital setting are suitable to become an organ donor.¹ Therefore, thoroughly screening every potential organ and tissue donor is essential to maximize successful donations: both by mitigating the risk of infection and disease transmission, in conjunction with the risk of discontinuing a donation and subsequent impact on the waiting recipients.²

The physical examination of the potential organ donor is used in conjunction with information obtained from the

Received 9 January 2019. Revision received 29 April 2019.

Accepted 30 April 2019.

¹ Discipline of Nursing, Faculty of Health, University of Canberra, Canberra, ACT, Australia.

² School of Nursing and Midwifery, Gold Coast Campus, Griffith University, Queensland, QLD, Australia.

³ Discipline of Public Health, Faculty of Health, University of Canberra, Canberra, ACT, Australia.

⁴ Division of Health Policy and Strategy, Northern Territory Department of Health, Darwin, NT, Australia.

⁵ Faculty of Health, University of Canberra, Canberra, ACT, Australia.

⁶ Medical School, College of Health and Medicine, Australian National University, Canberra, ACT, Australia.

⁷ Intensive Care Unit, Canberra Hospital, Garran, ACT, Australia.

Correspondence: Frank Van Haren, MD, PhD, EDIC, FCICM, Intensive Care Unit, Canberra Hospital, PO Box 11, Woden, ACT 2606, Australia. (frank.vanharen@act.gov.au).

J.A.C.H. contributed to the conception and design of the study and development of the survey instrument and performed the research, data analysis, and writing of the

article. K.R. contributed to the planning and design of the study, survey instrument, data analysis, and revisions of the article. K.B. contributed to the planning of data analysis and revisions of the article. M.J. contributed to the development of the survey instrument. F.V.H. contributed to the design of the study, survey instrument, data analysis, and revision of the article for important intellectual content.

The authors declare no funding or conflicts of interest. DonateLife ACT and University of Canberra contributed funding to cover the costs of publication.

Supplemental digital content (SDC) is available for this article. Direct URL citations appear in the printed text, and links to the digital files are provided in the HTML text of this article on the journal's Web site (www.transplantationdirect.com).

Copyright © 2019 The Author(s). *Transplantation Direct*. Published by Wolters Kluwer Health, Inc. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

ISSN: 2373-8731

DOI: 10.1097/TXD.0000000000000906

family, the potential donor's general practitioner (GP), and all available clinical data, past and present, to determine the donor's medical and social history. This information is collated and entered into an electronic donor record, which is transmitted electronically to transplant physicians to perform a risk analysis and determine the most suitable candidate on their waiting list to receive the donated organ.³ The electronic donor record physical examination form contains an outline of the front and back of the human body, together with a generic list of possible findings (eg, abrasions, scars, lacerations, and nonhospital needle sites) that can be electronically marked at the location on the body outline.⁴ There is space on the form for the donor coordinator (DC) to provide additional information or comments were necessary.

An integrative review of the literature conducted in 2017 identified minimal published literature about performing the physical examination on potential donors.⁵ The review acknowledged the donor physical examination as a component of donor screening, yet there is limited detail in the literature regarding the actual physical examination process.⁶⁻¹¹ The literature demonstrated some commonalities in regard to what constitutes a high-risk finding such as the presence of jaundice, tattoos, body piercings, nonmedical injection sites, signs of sexually transmitted infections, scars, oral thrush, and skin lesions, yet the compilation of findings varied. Escalation procedures for identified abnormalities during the physical examination were relatively consistent with performing biopsies, taking photographs of the finding, seeking second opinions, and performing additional imaging or laboratory investigations,^{7,11-13} yet the level of detail explaining the procedures varied. Only 2 education or training programs pertaining to donor physical examination were found during a search of the literature and internet.^{8,14} The content of the programs does not appear to be referenced, leading to the assumption the content is based on expert opinion, rather than evidence base practice. In addition, Van Geyt et al¹¹ also suggested that the relevance of the physical examination assessment findings are dependent on the expertise of the person conducting the examination. It appears organ and tissue donation organizations are performing a physical examination as a component of donor screening without determining or clearly outlining its specific practice or effectiveness in donor screening. No national guidelines or training is available outlining how to perform a donor physical examination in Australia.

The purpose of the research project was to determine current practice of performing the physical examination on potential organ and tissue donors in Australia. The results will enhance knowledge in this area of practice and potentially identify opportunities for practice development.

MATERIALS AND METHODS

Design

A national cross-sectional online survey was circulated to collect data during a 5-week period in September and October 2017.

Survey Instrument

An extensive review of the literature did not identify a survey instrument relevant to the physical examination performed on potential organ and tissue donors. The literature review informed the development of the survey in this study, with items empirically derived to capture the general approach

to the physical examination, education and training provided to staff, assessment techniques, high-risk findings, and last, escalation procedures. The survey also included a series of demographic questions to collect background contextual information about the survey respondents including their role, employment duration and location, professional background, qualifications, and employment type (full or part time).

An Advisory Panel was formed by inviting all 8 DonateLife Agency Managers to provide critical review of the survey instrument. The DonateLife Agency Managers are responsible for managing and leading each Agency to succeed in delivering a high performing donation service in each State and Territory.¹⁵ The Advisory Panel was asked to review the content validity of the survey and rate each question's relevance to the project, by selecting either 1—highly relevant, 2—quite relevant, 3—somewhat relevant, or 4—not relevant. Demographics and a final question inviting respondents to provide any general comments / feedback were excluded when calculating the instrument's reliability and validity (SDC, <http://links.lww.com/TXD/A216>).

The final survey (SDC, <http://links.lww.com/TXD/A216>) consisted of 43 items in total. The survey incorporated 7 current practice items, 6 escalation and donor exclusion items, and 6 education and training items incorporating categorical and qualitative questions. Also, 24 participant knowledge and attitude items using 5-point Likert scales from 1 = strongly agree to 5 = strongly disagree to collect participant's level of agreement to statements about the physical examination.

Respondents and Data Collection

A purposive sampling technique was used to invite all who work in DC roles across Australia (n = 125) to participate. Organ and tissue DCs are nurses responsible for facilitating organ and tissue donation, championing donation, and providing clinical and community education. An invitation to participate, containing a link to the online (Qualtrics) survey was sent via the Australian Organ and Tissue Authority's (OTA) Clinical Programs Director, to the 8 DonateLife Agency Managers to distribute to the target population within their jurisdiction. A reminder email was sent 2 and 4 weeks after the initial invitation to participate.

Data Analysis

SPSS version 25 was used to complete quantitative data analysis. Continuous variables capturing years of experience and the number of examinations performed in the previous 12 months are reported as mean and SD. Categorical variables inclusive of the 5-point Likert scale were presented as frequencies and percentages.

Qualitative data was captured through a small number of open-ended questions to determine the participant's physical examination practice, training and education, escalation procedures and the detail surrounding the potential donors who were excluded from donating based on a physical examination finding. Content analysis of the data collected from the open-ended questions was entered into Excel, with common themes collated and categorized inductively with 3 researchers using text documents.

Ethics and Endorsement

The study received ethics approval from the University of Canberra (Human Research Ethics Committee 17-243) and the local health service (Australian Capital Territory Health

TABLE 1.
Demographics of the study respondents

Variable	N (=75)	%
Years worked in the sector		
0–4	30	49
5–9	22	36
>10	9	15
State or Territory		
ACT	6	9.7
NSW	10	16.1
NT	3	4.8
QLD	14	22.6
SA	6	9.7
TAS	4	6.5
VIC	15	24.2
WA	4	6.5
Employment		
Part time	35	57
Full time	26	43
Completed postgraduate qualification		
Yes	60	97
No	2	3
Professional background prior to DonatLife		
ICU	52	84
ED	3	5
2 + ICU / ED / CCU	4	6
OT	1	2
Other	2	3

ACT, Australian Capital Territory; CCU, coronary care unit; ED, emergency department; ICU, intensive care unit; NSW, New South Wales; NT, Northern Territory; OT, operating theater; QLD, Queensland; SA, South Australia; TAS, Tasmania; VIC, Victoria; WA, Western Australia.

Human Research Ethics Committee, ETHLR.17.118). The OTA also supported the study.

RESULTS

Seventy-five responses to the online survey were received (response rate 60%).

Respondents had worked within the organ and tissue donation sector for a mean 5.3 years (SD = 3.9), and the majority of respondents had an intensive care nursing background with postgraduate qualifications (see Table 1).

Current Physical Examination Practice

DC roles predominantly perform the physical examination in Australia (see Table 2). Respondents performed a mean 10.5 physical examinations in the past 12 months (SD = 8.3), and it reportedly takes a mean 26 minutes to complete the physical examination (SD = 12.7; range 5–60 min). Sixty-nine percent of respondents reported that the potential donor's GP is contacted before performing the physical examination.

The assessment techniques used to perform the physical examination were reported as observation 97% (N = 73), palpation 79% (N = 59), auscultation 40% (N = 30), and percussion 12% (N = 9). A majority of respondents (85%) reported using a head to toe approach to complete the physical examination (see Table 3).

Escalation Practices and Excluded Donors

There were 369 findings reported by 71 respondents from their past experience that they would identify as potentially

TABLE 2.
Current physical examination practices

Variable	N	%
The roles performing the physical examination (able to select >1 role)		
DSN	23	31
DSC	18	24
DSNC	50	67
DSM	1	1.3
ICU Dr	0	0
Other	0	0
No. of physical examinations performed in previous 12 mo		
0–4	15	22.7
5–9	19	28.7
10–14	15	22.7
15–19	3	4.5
20–24	7	10.6
>25	7	10.6
Timing of GP contact		
Before the physical exam	47	69
After the physical exam	14	21
Unsure	7	10

DSC, Donation Specialist Coordinator; DSM, Donation Specialist Medical; DSN, Donation Specialist Nurse; DSNC, Donation Specialist Nursing Coordinator; GP, General Practitioner; ICU Dr, Intensive Care Unit Doctor.

high risk. The 3 most common findings reported were injection sites (n = 61; 86%) followed by suspicious moles (n = 55; 77%) and unexplained scarring / suture lines (n = 36; 51%). The main high-risk findings reported by respondents are outlined in Table 4.

Escalation procedures mainly comprised consultation with a selection of specialists and further investigation / testing (see Table 5). Seeking a second opinion was reported by 97% of respondents. When asked who the participant's ask in the first instance, 66% ask the intensive care medical team, 10% ask the Donation Specialist Medical or Consultant on call, 12% ask a DC colleague, 9% ask the bedside nurse, and 3% ask a Doctor (unspecified speciality or location).

There were 18 (24%) respondents who reported experiencing cessation of a donation due to an abnormality identified during the physical examination. Inclusively, 13 (17%) respondents described the specific physical examination finding(s), including current and previously removed melanoma (6), intravenous drug use markings (2), genital warts (tracking into the potential donor's anal cavity) (2), squamous cell carcinoma (excluded tissue donation) (1), a new tattoo (1), unknown details regarding

TABLE 3.
Participant approaches to performing the physical examination

Reported approaches to the physical examination	N	%
Head to toe	55	85
Front and back	41	63
Full undress / Ted stockings removed	21	32
Inspect total surface area	4	6
Reference made to the electronic donor record physical examination list of potential findings	3	5
Systematic approach	3	5
Airway, breathing, circulation	1	2

Note: respondents may have selected >1 response.

TABLE 4.**Reported physical examination main findings classified as high risk**

Reported high-risk findings	%	N
Injection sites / track marks	86	61
Suspicious mole	77	55
Unexplained scarring / suture line	51	36
Skin lesions	45	32
Genital lesions	35	25
Tattoos	35	25
Lumps and bumps	31	22
Rashes	31	22
Signs of infection	27	19
Wounds	17	12
Bruising	13	9
Breast abnormality	11	8
Enlarged lymph node	8	6
Skin piercings	7	5
Poor perfusion to extremities	6	4
Genital trauma	4	3
Discoloration of skin (jaundice/mottling)	4	3
Dental abnormality	4	3
Trauma	3	2
Age to general appearance comparison	3	2
Abnormal breath sounds	3	2
Distended abdomen	3	2
Tracheal aspirate	3	2
Necrotic areas	3	2
Fluid overload / edema	3	2
Signs of self-harm	1	1
Liver mass	1	1
Pressure injuries	1	1
Cachexia	1	1
Congenital abnormality	1	1

an abnormal growth (1), cigarette burns which were found to be linked to the potential donor exchanging sex for money (1), and last, unexplained scarring (1).

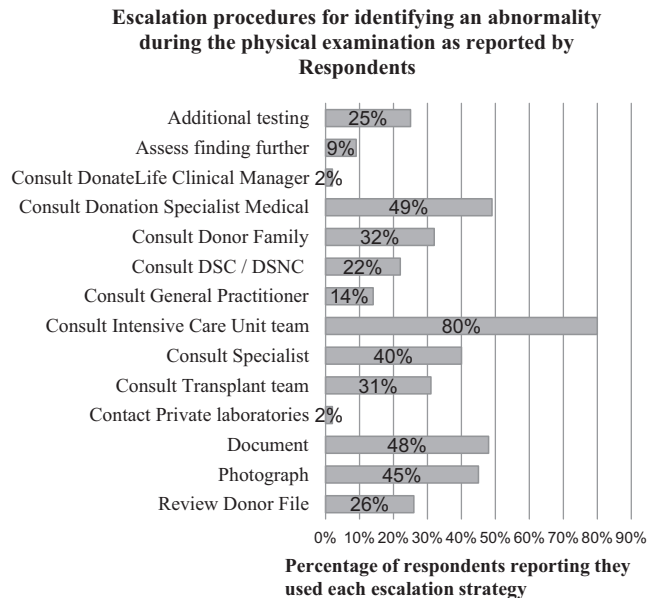
Participant Knowledge and Attitudes Towards the Physical Examination

Almost all respondents (94%) viewed physical examination as an important component of donor screening, 84% (n = 53) respondents agreed that they feel confident to identify signs of risk when they perform the physical examination; but only 8% (n = 5) of respondents agreed that practice of performing the physical examination is consistent around the country (see Table 6).

Most respondents (86%) agreed that transplant units are very interested in the potential donor physical examination, but only 44% agreed that transplant units often enquire about the donor's physical examination. The majority of respondents (92%; n = 58) agreed that a national guideline for performing the physical examination would be helpful.

Participant Education and Training

Fifty-two respondents (77%) reported receiving training and education to perform the donor physical examination. The reported training and education modes of delivery included theory and practice 48% (n = 23), theory only 44% (n = 21), and practice only 8% (n = 4). Respondents assessed

TABLE 5.**Escalation procedures as reported by respondents**

DSC, Donation Specialist Coordinator; DSNC, Donation Specialist Nursing Coordinator.

the education and training they received as extremely valuable 47% (N = 23), very valuable 33% (N = 16), moderately valuable 16% (n = 8), and slightly valuable 4% (N = 2).

DISCUSSION

This is the first study of its kind looking at current practice of performing the physical examination on potential organ and tissue donors in Australia. In summary, most viewed physical examination screening as important and felt confident to identify signs of potential risk when they perform the donor physical examination, but few considered the practice to be consistent around the country. Inconsistency relating to how the physical examination is approached, the escalation procedures used, participant knowledge and opinions towards the physical examination and the training and education provided to staff are observed in the survey results.

First, the reported time required to complete the physical examination varied (mean = 26 min; SD = 12.7). A physical examination performed in 5 minutes is going to contain less detail than a 60-minute examination. An explanation for the diverse examination comprehensiveness includes most notably the significant variation in the utilization of the assessment techniques observation, palpation, percussion, and auscultation.

The Transplantation Society of Australia and New Zealand's (TSANZ) Clinical Guidelines for Organ Transplantation from Deceased Donors state "Physical examination provides information relevant to possible disease transmission risks. This should include examination for skin lesions, scars indicating prior surgery (including those suggestive of removal of skin lesions and breast lumps), lumps and masses (including any of the lymph nodes and the breasts), and needle track marks suggesting intravenous drug use" (p 10).² The survey results in our study are not all aligned with elements from the TSANZ excerpt. The rationale for current clinical practice not reflecting the national clinical guideline is unknown. Yet, while this

TABLE 6.**Respondent attitudes and knowledge about the physical examination**

is a national clinical guideline that outlines what the examination should include, it does not provide guidance on how to perform a donor physical examination, nor do standardized training and education programs for DCs exist to support it.

Respondents (79%) reported performing palpation with different foci: abdomen (55%), lymph nodes (38%), and breast (52%). In order to examine the assumptions that underpin these assessment techniques and in acknowledgment of the recorded occurrences of donor-derived malignancies in transplant recipients,¹⁶ we turn to palpation as a way to identify and obtain information about masses, in particular, masses that may relate to undiagnosed malignancy.

Irrespective of the most efficient way to diagnose breast cancer, it is a common cancer diagnosed in woman.¹⁷ One in 8 women on average are expected to be diagnosed with breast cancer before the age of 85,¹⁸ and 75% of breast cancers develop in woman who are over 50 years of age.¹⁹ If breast cancer metastasizes, it often impacts the liver and lungs, which are 2 commonly donated organs.²⁰ In 2016, there were 503 organ donors in Australia (45% were female), and there were 314 liver

and 196 lung transplant recipients.^{21,22} Literature published by Barton et al²³ suggests a clinical breast examination has a low sensitivity (54%) yet the specificity is high (94%). Reference is also made to women who are at an increased risk, including for example having a strong family history of breast cancer and inheriting the *BRCA1* and *BRCA2* gene mutations, benign breast conditions and menarche before the age of 12, and how a women's risk assessment can impact screening.²⁴ Yet, many of the above risk factors for breast cancer are not asked nor investigated during current donor screening practices. Consequently, breast cancer is of interest in establishing donor risk.

In a recent published case report, 3 out of 4 transplant recipients died as a result of donor-derived breast cancer from a single donor in Europe.¹⁶ Although the donor malignancy was occult at the time of donation, the donor had no previous medical history, no abnormal findings during donor screening including after a complete physical examination.¹⁶ The authors highlight that all donors should have a breast examination as part of their complete medical examination,¹⁶ yet as the results from our study demonstrate, this is not routine practice in

Australia with only 52% agreeing a breast examination should be performed during the physical examination.

Assessing a potential donor is sometimes referred to as putting the pieces of the puzzle together. It relies on timely, complete, and accurate collation of information and communication to members of the donation and transplantation team. Communication gaps at all levels of the donation process, particularly reporting donor-derived infection transmission risks, have been linked to adverse recipient outcomes.²⁵ For this reason, to minimize error and missed information, the medical social questionnaire, speaking with the GP and performing the physical examination are 3 components of donor screening that ideally should be performed by the one DC.

Reported high-risk findings and escalation procedures were not dissimilar to those previously identified in the literature.⁵ Respondents reported escalation procedures of consultation with specialists and instigating further testing. Yet, the order of contacting each specialist for consultation differed and additional testing is likely to be influenced by the availability of local resources. In our study, there were 18 (24%) respondents who reported identifying an abnormality during their physical examination that stopped the donation from proceeding. The reported reasons to exclude an organ donor based on a physical examination finding were aligned to the TSANZ Clinical Guidelines.

Training and education on how to perform the physical examination have only been provided to 77% of survey respondents. There appears to be a disconnection between training and education provided to staff, participant confidence, and current practice. Perhaps, it is understandable for respondents to feel confident in the context of local physical examination practice, because the national context to this point in time has been unknown. Alternatively, prior education and training as an undergraduate and postgraduate nurse may have prepared nurses for their role as a DC.

A study conducted by Birks et al²⁶ explored the physical examination skills being taught in preregistration nursing programs across Australia. The survey completed by 53 academics was conducted to determine what physical examination skills were taught with and without practice or not taught at all. Inspection of skin lesions was taught with practice (66%), without practice (28%), or not taught at all (6%). Palpation of lymph nodes in the neck was taught with practice (55%), without practice (21%), or not taught at all (23%). This is not dissimilar to clinical breast examination that was not taught at all (38%), or taught without student practice (49%). There is variation in how and what is taught, compared with what is practiced in the clinical setting.²⁶

In reference to postgraduate training, Cicolini et al²⁷ investigated physical assessment techniques performed by registered nurses in Italy. They suggest critical care nurses are generally well trained and perform a more complete physical examination due to the challenges associated with caring for higher risk patients on their own and being involved in the decision-making process for their patients.²⁷ A DC has a repertoire of important skills specific to donation. Yet, whether they are appropriately trained and educated to perform all components of the physical examination accurately seems unlikely given there is such variation in the content taught at the preregistration level, and screening a donor for transplantation by examining, for example, sites of intravenous drug use, skin for suspicious looking moles or palpating their lymph nodes and breast tissue for masses is outside the usual physical assessment performed by a critical care nurse.

Currently, national training and education programs in Australia consist of an orientation online learning program for new organ and tissue donation staff, an Introductory Donation Awareness Training program, and the Family Donation Conversation (FDC) core and practical workshops. Further training and education of DCs are undertaken within each State and Territory donation agency. This is a key opportunity for improved and consistent practice by outlining clear national expectations incorporating an evidence base and staff training on how to perform the elements of the physical examination. It could be viewed as an opportunity for Australia to innovate and create a modernized and valuable learning opportunity for Australian donation staff locally, reducing the need to seek this information from international training programs.

Broader donor case facilitation and donor screening practices have not been studied in this project, yet given the inconsistencies observed in current physical examination practice, it raises the question, does inconsistent donor screening practice exist more broadly? If this is the case, development of a national training and education program incorporating the donor physical examination would promote consistent practice and an opportunity to professionally develop Australian DCs.

Studying current practice has certainly identified components of the physical examination that are being performed consistently: specifically, examining the front and back of the donor; measuring an adult donor's girth at the xiphoid process; possible locations for intravenous drug use and support for the examination's usefulness. Collective analyses of the project's results, however, have identified opportunities for practice improvement: specifically, nearly all respondents agreed that a national guideline for performing the potential donor physical examination would be helpful.

The strength of this study is that it is the first of its kind aimed at determining current physical examination practice. The 60% response rate in this study, respondents residing in all States and Territories, and the range of years respondents have worked in the organ and tissue donation sector have ensured a candid, national snapshot of current practice. The limitations include the risk of duplicate survey responses due to a reusable survey link being circulated on behalf of the primary researcher and not being able to delete incomplete survey responses due to the anonymity of respondents.

The Australian organ and tissue donation service consist of a dispersed team delivering the one donation service across the country, which potentially impacts collaboration and consistency. The physical examination performed on potential donors is a routine part of donor screening, yet it is evident from this study current practice contains inconsistencies that may be attributed to: minimal international literature to highlight the evidence base for the examination; no national guidelines for DCs; a deficiency in national advanced training for the staff who are on the front line of the donation service in Australia; and the impact of a dispersed team on organizational culture. Further research into broader components of donor screening and coordination facilitated by DCs may discover further inconsistencies in practice.

To future proof the donation service, a robust framework is needed to outline expected practice, which aids in setting the conditions for an increasing donation rate that in turn will lead to greater capacity. The network can be guided by the success of the national FDC workshops on family consent rates when a trained requestor is in the room (72%),

compared to when they are not (45%).¹ Implementing the FDC workshops nationally, with trained requestors and consistent content, has synchronized the terminology, the key messages, and the general approach to the FDC, and this consistent approach has clearly led to consistent results. With this in mind, the results of this study and in capturing the current culture through conducting an organizational culture survey, the following recommendations to address the inconsistencies in physical examination practice have been made:

1. Discuss current physical examination practice with the leading donation and transplantation stakeholders in Australia to determine the expected comprehensiveness and scope of the physical examination.
2. Conduct an organizational culture survey to increase awareness of potential factors influencing the approach to donor screening and the subsequent impact on increasing the donation rate.
3. Develop advanced national training for DCs that is developed comprehensively to overcome the barriers of a dispersed team and current inconsistent practice. With a focus on a needs analysis, complimentary delivery modes, trained facilitators, and an implementation and evaluation plan. Together with international donation and transplantation consultation with organizations that have established training and education programs to inform the content.
4. Align physical examination practice and training with the OTA's vigilance and surveillance systems.
5. Compliment the national advanced training program with a national guideline to provide a cognitive aid and support DCs performing the physical examination.
6. Evaluate the advanced training program throughout its implementation and delivery, and repeat the physical examination survey to determine and compare current practice. Last, define both measures of effectiveness and measures of success in the evaluation phase.

CONCLUSIONS

In conclusion, the study has investigated the physical examination being performed on potential organ and tissue donors in Australia. This study is the first of its kind and although there have been reported areas of practice consistency, there are many variations in current physical examination practice. The inconsistencies can be partly attributed to discrepancies in training and education of staff and no standardized national guideline documentation to clearly outline expected practice. Additionally, a paucity of published literature determining the effectiveness of the physical examination and outlining specific practice is also acknowledged. This study has provided the evidence to pursue practice improvement in this area of donor screening by primarily consulting with organ and tissue donation and transplantation leading stakeholders in Australia and overseas, conducting an organizational culture survey, developing national advanced training and guidelines for DCs, and evaluating the implementation and improvement in current practice by repeating this study in the next couple of years.

REFERENCES

1. Australian Government Organ and Tissue Authority. *Australian Donation and Transplantation Activity Report 2017*. 2018. Available at https://donatelife.gov.au/sites/default/files/2017_Australian_Donations_and_Transplantation_Activity_Report.pdf. Accessed September 10, 2018.
2. The Transplantation Society of Australia and New Zealand. *Clinical Guideline for Organ Transplantation from Deceased Donors Version 1.1*. 2017. Available at <https://www.tsanz.com.au/organallocationguidelines/documents/ClinicalGuidelinesV1.1May2017.pdf>. Accessed August 30, 2018.
3. Electronic Donor Record Enhances Australian Organ and Tissue Donation Processes [press release]. Senator The Hon Fiona Nash Assistant Minister for Health Commonwealth of Australia. 2014. Available at <https://webarchive.nla.gov.au/awa/20140801045959/http://www.donatelife.gov.au/electronic-donor-record-enhances-australian-organ-and-tissue-donation-processes-0>. Accessed November 28, 2018.
4. Australian Government Organ and Tissue Authority. *Electronic Donor Record Standard Operating Procedure and User Guide version 5.1*. 2014. Available at <http://www.atca.org.au/files/K.pdf>. Accessed February 1, 2019.
5. Holloway JAC, Ransie K, Currie M, et al. An integrative review of the physical examination performed on deceased potential organ and tissue donors. *Progress in Transplantation*. 2019;29:84–94.
6. NHS Blood and Transplant. *Patient (potential donor) assessment*. 2017. Available at <https://www.odt.nhs.uk/odt-structures-and-standards/organ-donation-retrieval-and-transplantation-teams/patient-potential-donor-assessment/>. Accessed April 29, 2017.
7. Beele H, Van Wijk M, Bokhorst A, et al. Physical examination of the potential tissue donor, what does literature tell us? *Cell Tissue Bank*. 2009;10:253–257.
8. NATCO. Donor Physical Assessment presentation slides. *The Organ and Tissue Recovery Process*; 2012; Tempe Arizona. <http://natco1.org/education/documents/procurementfinalprogrambookpressquality.pdf>. Accessed April 1, 2017.
9. European Directorate for the Quality of Medicines and Healthcare of the Council of Europe. *Guide to the Quality and Safety of Organs for Transplantation 6th Edition*. Strasbourg: 2016.
10. Costa AN, Grossi P, Castiglione AG, et al. Quality and safety in the Italian donor evaluation process. *Transplantation*. 2008;85:s52–s56.
11. Van Geyt C, Van Wijk M, Bokhorst A, et al. Physical examination of the potential tissue donor, what do European tissue banks do? *Clin Transplant*. 2010;24:259–264.
12. Singh S, Blevins MB, Wakeman M, et al. The utility of recovery biopsies in determining donor suitability. *Cell Tissue Bank*. 2012;13:565–567.
13. Fiorentino M, D'Errico A, Corti B, et al. A multiorgan donor cancer screening protocol: the Italian Emilia-Romagna region experience. *Transplantation*. 2003;76:1695–1699.
14. Gift of Life Institute. *Conducting a Comprehensive Donor Physical Assessment eLearning*. 2016. Available at <http://store.giftoflifeinstitute.org/product15.html>. Accessed March 1, 2016.
15. Australian Government Organ and Tissue Authority. *DonateLife Network Role and Responsibilities Guidelines version 3*. 2016. Available at <https://donatelife.gov.au/sites/default/files/DLN%20Roles%20and%20Responsibilities%20Guidelines.pdf>. Accessed June 30, 2018.
16. Matsier YAH, Terpstra ML, Nadalin S, et al. Transmission of breast cancer by a single multiorgan donor to 4 transplant recipients. *Am J Transplant*. 2018;18:1810–1814.
17. Provencher L, Hogue JC, Desbiens C, et al. Is clinical breast examination important for breast cancer detection? *Curr Oncol*. 2016;23:e332–e339.
18. Australian Institute of Health and Welfare & Cancer Australia. *Breast Cancer in Australia: An Overview. Cancer series no. 71. Cat. no. CAN 67*. Canberra: AIHM;2012. Available at <https://www.aihw.gov.au/reports/cancer/breast-cancer-in-australia-an-overview/contents/table-of-contents>. Accessed May 19, 2018.
19. Thistlethwaite J, Stewart RA. Clinical breast examination for asymptomatic women - exploring the evidence. *Aust Fam Physician*. 2007;36:145–150.
20. Jin X, Mu P. Targeting breast cancer metastasis. *Breast Cancer (Auckl)*. 2015;9(Suppl 1):23–34.
21. Australia and New Zealand Organ Donation Registry. *2017 Annual Report Section 4: Deceased Organ Donor Profile*. Adelaide Australia: Australia and New Zealand Dialysis and Transplant Registry; 2017. Available at https://www.anzdata.org.au/wp-content/uploads/2017/10/c04_profile_v1.0_20171109.pdf. Accessed April 29, 2017.
22. Australia and New Zealand Organ Donor Registry. *2017 Annual Report Section 2: Overview of Organ Donation Activity in Australia and New Zealand*. Adelaide Australia: Australia and New Zealand Dialysis and Transplant Registry; 2017. Available at https://www.anzdata.org.au/wp-content/uploads/2017/10/c02_donation_v1.0_20171026.pdf. Accessed April 29, 2017.
23. Barton MB, Harris R, Fletcher SW. The rational clinical examination. Does this patient have breast cancer? The screening clinical breast examination: should it be done? How? *JAMA*. 1999;282:1270–1280.

24. Breast Cancer Network Australia 1998–2018. *Risk factors*. 2018. Available at <https://www.bcna.org.au/breast-health-awareness/risk-factors/>. Accessed May 17, 2018.
25. Miller R, Covington S, Taranto S, et al. Communication gaps associated with donor-derived infections. *Am J Transplant*. 2015;15:259–264.
26. Birks M, James A, Chung C, et al. The teaching of physical assessment skills in pre-registration nursing programmes in Australia: issues for nursing education. *Collegian*. 2013;2014:241–253.
27. Cicolini G, Tomietto M, Simonetti V, et al. Physical assessment techniques performed by Italian registered nurses: a quantitative survey. *J Clin Nurs*. 2015;24:3700–3706.