Successful multi-organ donation from a district-level hospital without an intensive care unit – a case series of referrals over an 18-month period

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Organ and tissue donation depends on non-transplant clinicians to identify and timeously refer potential donors and to counsel families compassionately about the prognosis at end of life. Organ donation referral is often felt to be beyond the capacity of district-level hospital services. In this case series, we report on four referrals from a geographically remote, public sector district-level hospital, and review the identification, referral and consent process of potential donors after brain death, and also donors after circulatory death. For the one successfully consented donor we report on the donor work-up and management, and the outcome of the organ recovery and organ allocation process.

Methods

We report on a case series of donor referrals from a remote provincial district-level hospital in SA over an 18-month period following an educational outreach project. All organ donor referrals from the hospital were recorded by the transplant co-ordinator on call for the referral centre, and recorded as per standard practice. The clinical circumstances, timing of the referral, advice given on the potential for donation and outcome were critically reviewed. Ethics approval was given by the University of Cape Town, Human Research Ethics Committee (ref. no. HREC REF:185/2019)

Case 1

A 42-year-old hypertensive patient on treatment collapsed. The patient was transferred to George Provincial Hospital, where a computed tomography (CT) scan showed a massive spontaneous intracranial haemorrhage. The Glasgow Coma Score (GCS) remained at 2T on no sedation, and he was transferred ventilated back to Knysna for end-of-life care. A previous episode of pylonephritis in 2011 showed normal renal function. Consent was granted for organ donation and the transplant centre contacted, but consent was subsequently withdrawn while the brain death testing was being performed.

Case 2

A 30-year-old morbidly obese person collapsed at home. The patient was transferred to George Provincial Hospital for a CT scan, which showed intracerebral haemorrhage with severe brain swelling. The patient’s blood pressure was labile with a creatinine of 120 µmol/L. Urine dipstick showed 2+ protein. Organ donation was mentioned to that family at George Provincial Hospital prior to transfer back to Knysna for end-of-life care. The patient demonstrated persistence of some brain stem reflexes in the form of intermittent respiratory effort and a cough reflex. The patient was referred to the transplant team for potential donation after circulatory death. The transplant team assessed the patient as unsuitable for organ donation based on a combination of factors: that it would be a donor after circulatory death, that there was evidence of some renal impairment and that it would be a long-distance retrieval.

Case 3

A 47-year-old with an isolated stab to the head was admitted at 23h30 with a GCS of 13/15, but deteriorated rapidly during the night to a GCS of 2T requiring intubation, and became haemodynamically unstable, requiring initiation of an adrenaline infusion. A persistently high urine output of >500 mL/hr developed, and a clinical diagnosis of diabetes insipidus was made. The GCS remained 2T despite no sedation being given. The patient was assessed as a potential donor, with advice given to perform brain death testing 12 hours after the...
The local private sector was used to perform the echocardiogram to
determine suitability of a donor (when accepted referral triggers are met) may impact on the suitability of organs, it is important that decisions on suitability of a donor (when accepted referral triggers are met) are made by transplant teams who are aware of current urgent listings who may accept marginal donor organs, and are able to advise on the latest advances and capabilities related to organ retrieval.

In this case it was not one single factor that precluded organ
donation, but rather a combination of factors. The referral timing was
appropriate, as the clinical decision to withdraw mechanical ventilation had been made independent of the transplant team. The patient was expected to proceed to circulatory arrest upon withdrawal of non-beneficial life-sustaining treatment. Groote Schuur Hospital, which Knysna Provincial Hospital refers to, has a protocol in place to support active donor management. This is essential in ensuring that potential donors are not lost and patients and families are afforded the best chance to donate. This is particularly true in cases where diabetes insipidus can lead to massive fluid losses in the urine, and haemodynamic collapse if not replaced actively. Diabetes insipidus is present in 46% of brain dead patients. Vasopressor support is the norm and is needed in 97% of deceased donors. [11] Basic active management during the end-of-life counselling process ensures that clinicians do not deny a patient or their family the option to donate.

In our series, all four referrals were from different doctors. Brain death and donation after circulatory death are rare events. It is important for clinicians to identify all potential cases, to make an

### Table 1. Equipment required to maintain and manage a donor

<table>
<thead>
<tr>
<th>Equipment</th>
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</thead>
<tbody>
<tr>
<td>Ventilator</td>
</tr>
<tr>
<td>Blood gas machine</td>
</tr>
<tr>
<td>Automated blood pressure monitoring (can be non-invasive)</td>
</tr>
<tr>
<td>Continuous echocardiogram monitoring</td>
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<tr>
<td>Peripheral oxygen saturation monitoring</td>
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</table>
appropriately timed referral and facilitate an optimum approach for consent. Our series highlights the fact that aspects of best practice related to timing of referral and approach for consent need to form the basis of ongoing quality improvement that reach a broad group of doctors (Table 3). SA does not have a system where we audit our end-of-life care counselling processes, which should include the routine exploration with the family of the patient’s wishes towards organ and tissue donation. This is a feature of many high-performing systems where organ donation is recognised as a marker of good end-of-life care.

In Germany, 42% of missed potential donors are in non-university hospitals without a neurosurgical service. In the UK, all hospitals are required to have a designated ‘clinical lead in organ donation’ as a way to ensure that there is a local institutional expert who can be consulted. In SA, we always have a transplant co-ordinator a telephone call away, but formally acknowledged and trained local clinical links, as in the UK system, may be a model we can emulate.

Organ donation is always an altruistic act from the donor and their family. No financial incentive is provided. It is important to note that the organ donation registry is not considered an advance directive in SA, and legally the next of kin must and will always be approached for consent. This consent can be withdrawn at any point prior to the organ recovery operation, as it was in our first case. Organ donation in the public sector is also an altruistic act by the referring hospital, with no system in place to ensure that the cost of donor work-up, maintenance and organ recovery is recovered by the hospital. This may function as a disincentive for smaller hospitals to contribute actively. In the private sector, costs of the donor maintenance and organ recovery are recovered from the hospital allocated the organs, and co-ordinated by the private transplant co-ordinator, but theatre time often has to be negotiated as elective cases may need to be rescheduled.

Allocation of organs in SA is on a national basis for patients meeting urgent listing criteria for heart, lungs and liver, as these patients face imminent death without a transplant (Table 4). If there is no urgent national listing, as in the case of the donor in this case series, the organs are allocated based on the allocation criteria within that province. For heart, lungs and liver this is based on severity of

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**Table 2. Donor assessment after comprehensive history**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Infectious risk</th>
<th>Kidney</th>
<th>Liver</th>
<th>Lung</th>
<th>Heart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required</td>
<td>Virology testing: HIV*, hepatitis B, hepatitis C, syphilis, CMV, EBV†</td>
<td>Urea and electrolytes, urine dipstix</td>
<td>LFT, INR, Na, height and weight</td>
<td>CXR, ABG height and weight, gender</td>
<td>CXR, ECG, height and weight, gender</td>
</tr>
<tr>
<td>May be required</td>
<td>TB Gene Xpert, tracheal aspirate, blood culture</td>
<td>Ultrasound, urine protein creatinine ratio</td>
<td>CT scan, ultrasound</td>
<td>CT scan</td>
<td>ECG, angiogram</td>
</tr>
</tbody>
</table>

CMV = cytomegalovirus; EBV = Epstein-Barr virus; LFT = liver function test; INT = international normalised ratio; CXR = chest X-ray; ABG = arterial blood gas; ECG = echocardiogram; CT = computed tomography.

*HIV testing is initially serological, with subsequent nucleic acid testing (NAT) batched with blood bank runs to maximally reduce the window period.

†CMV and EBV positivity are not immediately required for allocation, but may alter recipient management.
illness, but is offered to the waiting list within the healthcare system (public or private) of the donor first. Only when there is no suitable recipient on the waiting list is it offered to the other healthcare system. In the case of this donor, the lack of suitable state patients on the waiting list resulted in these organs being allocated to the private sector. Kidneys are always allocated within the province of the donor, and in the Western, Eastern and Northern Cape provinces are allocated through an online points-based allocation system. This system factors in age, time on the waiting list and crossmatch status to optimise long-term transplant outcomes. The first kidney is allocated to the patient with the highest score in the healthcare system of the donor, while the second kidney is allocated to the patient with the highest score on a combined list of public and private patients. Renal allocation practice is governed regionally and ensures that the donor hospital system always receives at least a kidney from the resources devoted to organ recovery.

**Conclusion**

It is possible for small public hospitals to successfully support organ transplantation in SA. This is dependent on motivated and informed clinicians referring all potential donors. There is a need for continued quality improvement in terms of our systems and educational efforts to further increase the donor pool and improve access to transplantation.

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**Table 3. Referral clinician rank, appropriateness of referral, timing of consent request, best practice consent request and outcome**

<table>
<thead>
<tr>
<th>Case</th>
<th>Time of referral</th>
<th>Doctor referring</th>
<th>Appropriate referral</th>
<th>Timing of consent request</th>
<th>Best practice consent attempt</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11h00</td>
<td>Medical officer (clinical manager)</td>
<td>Yes</td>
<td>Prior to formal death declaration</td>
<td>No</td>
<td>Consent withdrawn</td>
</tr>
<tr>
<td>2</td>
<td>21h30</td>
<td>Community service doctor</td>
<td>Yes</td>
<td>No formal request made. Organ donation had been mentioned</td>
<td>No</td>
<td>Not a candidate</td>
</tr>
<tr>
<td>3</td>
<td>07h15</td>
<td>Community service doctor</td>
<td>Yes</td>
<td>No request made</td>
<td>Yes</td>
<td>Potential donor suffered cardiac arrest during certification</td>
</tr>
<tr>
<td>4</td>
<td>20h15</td>
<td>Family physician</td>
<td>Yes</td>
<td>After brain death declaration and assessment of donation potential with transplant team</td>
<td>Yes</td>
<td>Heart, liver and kidneys transplanted</td>
</tr>
</tbody>
</table>

**Table 4. Information required to allocate organs**

<table>
<thead>
<tr>
<th>Blood group</th>
<th>Tissue typing bloods</th>
<th>Donor height, weight and gender*</th>
<th>Assessment of organ quality and risk†</th>
</tr>
</thead>
</table>

*Used in allocation of liver, heart and lungs where size matching is a consideration.

†More acutely ill patients may accept a lower-quality/higher-risk organ.

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**Declaration. None.**

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