

# Psychosocial Factors, Knowledge and Attitudes Influencing Skin and Heart Valve Donation among Healthcare Professionals in Singapore

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## Abstract

**Introduction:** In Singapore, tissue donation is covered under the Medical (Therapy, Education and Research) Act. The objective of this study is to review the demographic and psychosocial factors, which may cause hesitation/unwillingness amongst healthcare professionals towards tissue donation. **Materials and Methods:** A survey comprising 18-items was conducted at the Singapore General Hospital and National Heart Centre Singapore. A total of 521 individuals participated in the survey. Descriptive statistics were performed for the demographic profiles of participants, the factors leading to the support of tissue donation, reasons for hesitation/reluctance to donate tissue and motivating factors to discuss tissue donation with next-of-kin. Pearson's chi-square and Fisher's exact tests were employed to assess possible association between various factors and support towards tissue donation. Analyses were performed using Statistical Package for Social Sciences V.21.0 software. **Results:** A total of 64.9% of participants had heard about skin donation; 48.9% had heard about heart valve donation; 4.5% were tissue pledgers. The primary reason for pro-donation was the altruism of "improving someone's quality of life". However, a majority stated they "can decide this in the later part of life" as their main reason for hesitation; 82.3% were willing to discuss their tissue donation wish with next-of-kin, while 53.1% were likely to make the decision of donation on behalf of their deceased next-of-kin. **Conclusion:** Results highlighted important psychosocial and professional factors that influence the hesitation/reluctance towards donation. Hence, there is a need to re-strategise educational efforts in accordance with the target audiences and address specific misconceptions and concerns.

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**Key words:** Heart valve banking, Tissue donation, Skin allografts, Skin banking

## Introduction

In Singapore, the donation of heart valves and skin is covered under a consent-based opt-in legislation called the Medical (Therapy, Education and Research) Act (MTERA). This Act allows individuals who wish to pledge their organs and tissues upon death for transplant, research or education purposes to opt-in by completing a pledge form. MTERA also gives family members of the deceased the right to donate his/her organs and tissues upon death if they wish to do so.<sup>1</sup> It relies solely on the goodwill of individuals to volunteer and donate their own or their next-of-kin's organs/tissues as an altruistic act.

Though the Act has been in existence for the past 42 years, the organ and tissue donation rate has remained dismal. In 2012, there were only 67,274 organ pledgers in the Organ Donor Registry out of the 5.3 million residents (1.3%) of Singapore.<sup>2</sup>

Studies have identified several external factors that influence the personal attitudes of individuals towards organ donation and transplantation. These external factors include experiential, educational, social, cultural and religious factors.<sup>3,4</sup> The attitudes of healthcare professionals have been linked to low level of knowledge pertaining to organ/tissue donation, resulting in limited donor pool.<sup>5</sup>

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It is vital to address the knowledge deficits of healthcare professionals and understand their attitude towards organ/tissue donation. This is crucial as most of them assist in identifying potential donors and educating the public and fellow colleagues about donation. Should they undertake their roles effectively, this will have a direct impact on increasing the number of donors.<sup>3,6</sup> However, to date, limited research has been conducted to explore the knowledge and attitude of healthcare professionals in Singapore towards tissue donation. Therefore, this survey was conducted with the aim of reviewing the demographic and psychosocial factors that may influence support or hesitation/reluctance towards tissue donation, the level of knowledge about tissue donation and possibly identify the areas for improvement. Results collated will be used to formulate publicity strategies for tissue banks, so as to provide adequate education addressing knowledge gaps to the healthcare professionals.

## Materials and Methods

### Study Population

In 2012, a survey comprising 18-items was conducted among healthcare professionals—doctors, nurses, allied health and support service staff, who play administrative, ancillary and non-clinical positions—working at the Singapore General Hospital and National Heart Centre Singapore (Appendix 1). The sample size of 521 participants was calculated in accordance with the occupation ratio of these 2 institutions.<sup>7</sup>

### Questionnaire-based Data Collection

Data was collated through an anonymous survey questionnaire that was distributed to the department through the individual departments' supervisors. The survey questionnaire was developed based on questions from other similar studies. Furthermore, certain modifications were made in the questionnaire so as to reflect relevant content as per our local context. A pilot study, results of which were not taken into account, was subsequently conducted among a group of healthcare colleagues to assess the clarity, ease of interpretation and functionality of the questionnaire. After further refinement of the questionnaire, it was circulated among the healthcare professionals. Informed consent was assumed when survey participants completed and returned the questionnaire. Ethical consideration was achieved by anonymity as participants were only required to identify their current roles in their institutions and no other personal identifier was solicited or recorded.

### Data Analysis

Descriptive statistics were performed for the demographic profiles of the participants, factors leading to support and

consent towards tissue/organ donation, reasons for hesitation or reluctance for tissue donation, and factors motivating participants to discuss tissue donation with family members and get their consent. Pearson's chi-square test and Fisher's exact test were employed to assess the possible association between various factors and support towards skin and heart valve donation, and the desire to willingly pledge to donate skin and/or heart valves. To identify predictors of willingness to donate and being a pledger, binary logistic regression modelling was performed. Input variables that showed potential association with outcome in Pearson's chi-square or Fisher's exact test with  $P$  value  $<0.1$  were included in multivariate analysis. All tests with  $P$  value  $<0.05$  were deemed significant. Analyses were performed using IBM Statistical Package for Social Sciences (SPSS) V.21.0 software (IBM, Armonk, NY).

## Results

A total of 521 participants were randomly surveyed, of which, 450 (86.4%) completed and returned the survey (Table 1).

### Knowledge of Skin and Heart Valve Donation

In the first part of this study, results revealed that there were more participants who had heard about skin donation (64.9%) than heart valve donation (48.9%). However, although a majority of participants claimed to support tissue

Table 1. Demographic Characteristics and Education Profile of Study Subjects

| Demographics Information | % of Respondents |
|--------------------------|------------------|
| Gender                   |                  |
| Male                     | 14.9             |
| Female                   | 82.7             |
| Unknown                  | 2.4              |
| Age group                |                  |
| 18 – 24                  | 28.4             |
| 25 – 34                  | 42.2             |
| 35 – 44                  | 15.8             |
| 45 – 54                  | 10.3             |
| ≥55                      | 3.1              |
| Race                     |                  |
| Chinese                  | 58.7             |
| Malay                    | 16.2             |
| Indian                   | 9.3              |
| Other                    | 12.7             |
| Unknown                  | 3.1              |

ITE: Institute of Technical Education; NITEC: National Institute of Technical Education Certificate

Table 1. Demographic Characteristics and Education Profile of Study Subjects (Con't)

| Demographics Information                         | % of Respondents |
|--------------------------------------------------|------------------|
| Nationality                                      |                  |
| Singaporean                                      | 72.2             |
| Permanent resident                               | 12.2             |
| Non-resident                                     | 15.3             |
| Unknown                                          | 0.2              |
| Religious affiliation                            |                  |
| Catholicism/Christianity                         | 30.4             |
| Buddhism                                         | 25.3             |
| Hinduism                                         | 5.1              |
| Islam                                            | 20.9             |
| Others                                           | 17.8             |
| Unknown                                          | 0.4              |
| Highest level of education                       |                  |
| No formal education to lower secondary           | 0.2              |
| Secondary or equivalent                          | 9.3              |
| A-levels or equivalent                           | 1.1              |
| National ITE certificate (NITEC) or higher NITEC | 6.7              |
| Polytechnic diploma or equivalent                | 22.9             |
| Higher/advanced diploma                          | 6.4              |
| Bachelor degree                                  | 42.4             |
| Postgraduate diploma or postgraduate degree      | 10.4             |
| Unknown                                          | 0.4              |
| Current role                                     |                  |
| Nurse                                            | 51.3             |
| Allied health                                    | 16.9             |
| Doctor                                           | 8.4              |
| Administration/ancillary/support                 | 23.3             |
| Involvement in transplant work                   |                  |
| No                                               | 66.4             |
| Patient care                                     | 31.6             |
| Communications/publications                      | 0.4              |
| Research                                         | 0.7              |
| Others                                           | 0.4              |
| Unknown                                          | 0.4              |

ITE: Institute of Technical Education; NITEC: National Institute of Technical Education Certificate

Table 2. Source of Information and Support and Willingness towards Tissue Donation

| Survey Questions                                                           | % of Respondents                   |
|----------------------------------------------------------------------------|------------------------------------|
| Heard, seen or read about skin donation                                    |                                    |
| Yes                                                                        | 64.9                               |
| No                                                                         | 34.4                               |
| Unknown                                                                    | 0.7                                |
| Heard, seen or read about heart valve donation                             |                                    |
| Yes                                                                        | 48.9                               |
| No                                                                         | 50.4                               |
| Unknown                                                                    | 0.7                                |
| Support the donation of human skin for transplantation                     | Mean = 1.56, SE = 0.035, SD = 0.74 |
| Support                                                                    | 55.9                               |
| Somewhat support                                                           | 35.2                               |
| Somewhat oppose                                                            | 6.0                                |
| Oppose                                                                     | 2.9                                |
| Support the donation of human heart valves for transplantation             | Mean = 1.55, SE = 0.033, SD = 0.70 |
| Support                                                                    | 54.9                               |
| Somewhat support                                                           | 37.5                               |
| Somewhat oppose                                                            | 5.4                                |
| Oppose                                                                     | 2.2                                |
| Signed up as a tissue pledger                                              |                                    |
| Yes                                                                        | 4.5                                |
| No                                                                         | 95.5                               |
| Willingness to donate skin upon death                                      |                                    |
| Very willing                                                               | 38.1                               |
| Somewhat willing                                                           | 35.9                               |
| Somewhat unwilling                                                         | 12.7                               |
| Very unwilling                                                             | 13.4                               |
| Willingness to donate heart valves upon death                              |                                    |
| Very willing                                                               | 41.1                               |
| Somewhat willing                                                           | 35.6                               |
| Somewhat unwilling                                                         | 11.6                               |
| Very unwilling                                                             | 11.8                               |
| If skin and heart valves were legislated under presumed consent, will you: |                                    |
| Opt out on both tissues                                                    | 0                                  |
| Opt out on skin donation                                                   | 18.2                               |
| Opt out on heart valve donation                                            | 9.3                                |
| Do nothing, as I support tissue donation                                   | 5.8                                |
| Do nothing, other reasons*                                                 | 65.8                               |

\*Majority of the reasons given are ambiguous intention or wish to know more information about donation.

donation, only 4.5% of them actively registered as a tissue pledger; 76.7% indicated that they are very or somewhat willing to donate heart valves as compared to donate skin tissue (74%). It was also found that if skin and heart valves were

legislated under presumed consent, most of the participants (65.8%) would do nothing to change their status, and more participants would opt out of skin donation (18.2%) as compared to heart valve donation (9.3%) (Table 2).

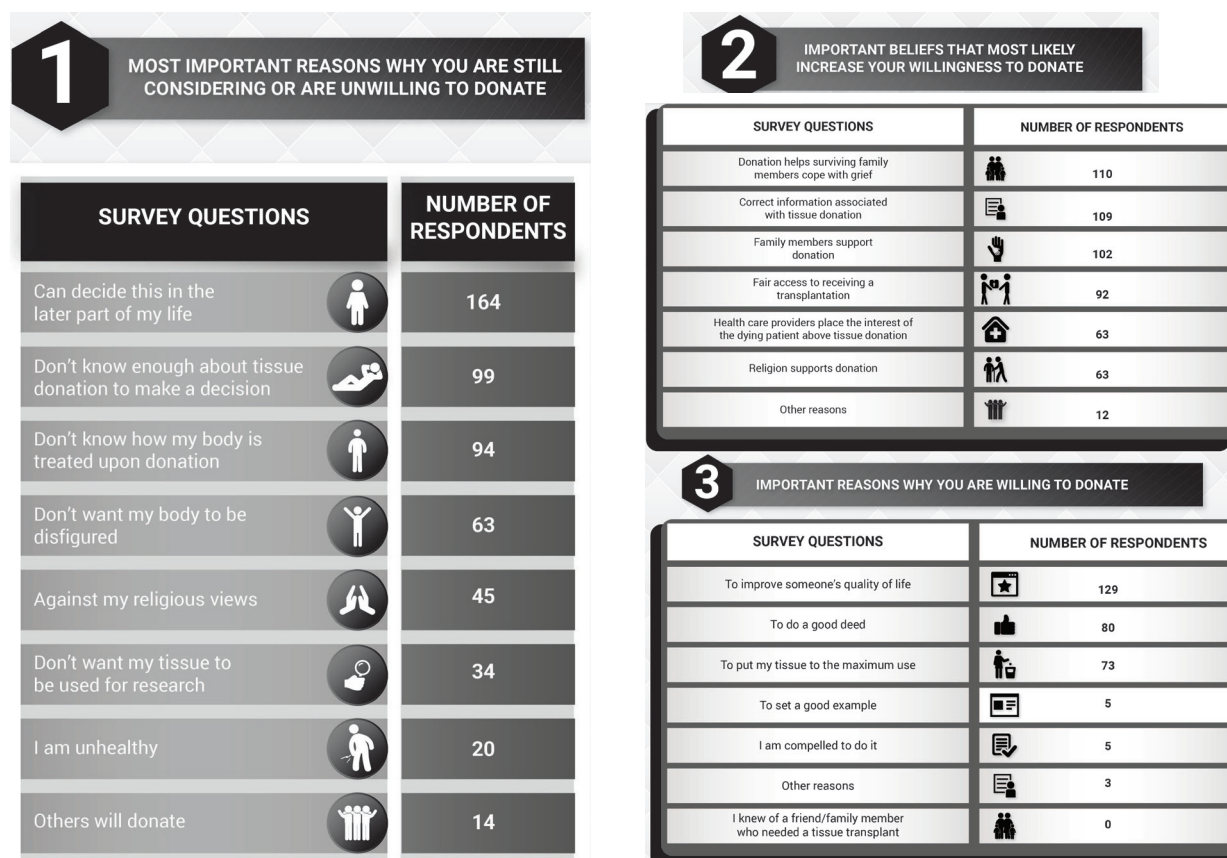


Fig. 1. Reasons for willingness and hesitation/unwillingness for tissue donation.

### Attitudes towards Tissue Donation

The 3 main reasons why the participants were willing to donate their tissues were the altruistic intention of “improving someone’s quality of life”, “doing a good deed” and “putting my tissue to the maximum use”. However, of those who were unwilling or still considering tissue donation, the majority stated 3 causes for their hesitation, namely, “I can decide this in the later part of my life”, “don’t know enough about tissue donation to make a decision” and “don’t know how my body is treated upon donation.” They indicated that the 3 important beliefs that will most likely increase their willingness to donate tissue were “donation helps their surviving family members to cope with grief”, if they were given “correct information associated with tissue donation” and if their “family members support donation” (Fig. 1).

### Willingness to Discuss with Family Members about Tissue Donation

A total of 82.3% of the participants were very or somewhat willing to discuss their wish to donate tissue with their family members; 53.1% were very or somewhat likely

to make the decision of tissue donation on behalf of their deceased family members, in the event that they did not know the latter’s wish about tissue donation. However, if their deceased family member had expressed interest in tissue donation upon death, 87.8% would honour the deceased’s wish and would be very or somewhat likely to donate their tissues. For those who were unwilling to donate their deceased family members’ tissues, none of the proposals of assistance with regard to hospitalisation or funeral expenses or priority in receiving tissue transplantation among others would increase their willingness to donate (Fig. 2).

### Support for Skin Donation

In univariate analysis, support for skin donation was found to be statistically significantly associated with race, higher level of education, religious affiliation, current role, involvement in transplant work, having seen/read/heard about skin donation, willingness to discuss about donation, likeliness to donate family member’s skin and wish to opt out if there was a change in legislation governing tissue donation. Participants with a degree or higher were reported to be 1.07 times more likely to support skin donation

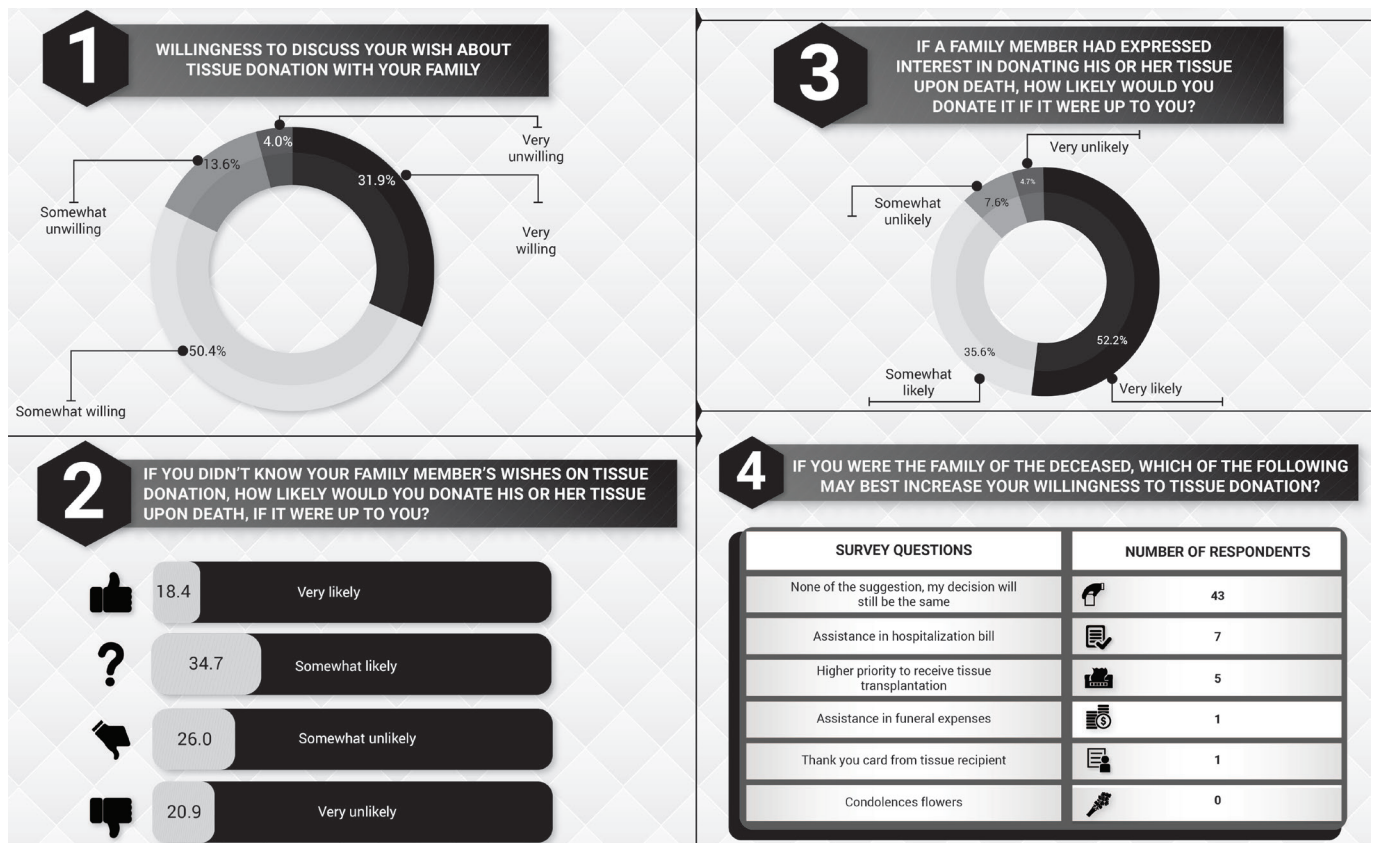


Fig. 2. Discussion of tissue donation with family members.

compared to those with other types of education levels (95% CI, 1.01 to 1.14;  $P = 0.02$ ).

However, in multivariate analysis, after adjustment of all demographic factors and willingness to discuss about tissue donation, as well as, likeliness to donate family member's tissue, support for skin donation was found to be statistically significantly associated with current role (nurse versus others), willingness to discuss about skin donation with family members, likeliness to donate family member's tissue after knowing his/her wish to donate and change in legislation. After adjustment, non-nursing participants were 3.17 times more likely to report their support for skin donation compared to nursing respondents (95% CI, 1.27 to 7.93;  $P = 0.01$ ) (Table 3).

#### Support for Heart Valve Donation

In univariate analysis, support for heart valve donation was found to be statistically significantly associated with race, higher level of education, religious affiliation, current role, involvement in transplant work, having seen/read/heard about heart valve donation, willingness to discuss about donation, likeliness to donate family member's skin

and wish to opt out if there was a change in legislation governing tissue donation. Respondents with a degree or higher were reported to be 1.06 times more likely to support heart valve donation compared to those with other types of education levels (95% CI, 1.0 to 1.12;  $P = 0.048$ ).

However, in multivariate analysis, after adjustment of all demographic factors and willingness to discuss about tissue donation, as well as, likeliness to donate family member's tissue, support for heart valve donation was found to be statistically significantly associated with current role (nurse versus others), having seen/read/heard about heart valve donation, likeliness to donate family member's tissue knowing his/her wish to donate and change in legislation and wish to opt out if there was a change in legislation governing tissue donation. After adjustment, non-nursing participants were 3.17 times more likely to report their support for heart valve donation compared to nursing respondents (95% CI, 1.18 to 8.50;  $P = 0.02$ ) (Table 4).

#### Tissue Pledger, Demographic Factors and Willingness to Donate Tissue

In univariate analysis, being a tissue pledger was found to

Table 3. Association between Support for Skin Donation for Transplantation and Demographic, Educational, Professional and Psychosocial Factors and Willingness in Donation

| Factor                                                                                                                                              | Unadjusted         |         | Adjusted           |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------|--------------------|---------|
|                                                                                                                                                     | OR (95% CI)        | P Value | OR (95% CI)        | P Value |
| Nationality                                                                                                                                         |                    |         |                    |         |
| Singaporean (n = 324)                                                                                                                               | 1.24 (0.52 – 2.98) |         |                    |         |
| Permanent resident (n = 55)                                                                                                                         | 0.92 (0.29 – 2.92) |         |                    |         |
| Foreigner (n = 69)                                                                                                                                  | 0                  | 0.77    | -                  |         |
| Gender                                                                                                                                              |                    |         |                    |         |
| Male (n = 66)                                                                                                                                       | 0.99 (0.02 – 1.08) |         |                    |         |
| Female (n = 372)                                                                                                                                    | 1*                 | 0.82    | -                  |         |
| Age by group                                                                                                                                        |                    |         |                    |         |
| 18 – 24 (n = 128)                                                                                                                                   | 0.74 (0.09 – 6.19) |         |                    |         |
| 25 – 34 (n = 190)                                                                                                                                   | 0.84 (0.10 – 6.81) |         |                    |         |
| 35 – 44 (n = 70)                                                                                                                                    | 0.82 (0.09 – 7.40) |         |                    |         |
| 45 – 54 (n = 46)                                                                                                                                    | 0.63 (0.07 – 5.90) |         |                    |         |
| ≥55 (n = 14)                                                                                                                                        | 1                  | 0.98    | -                  |         |
| Race (2 groups, n = 435)                                                                                                                            |                    |         |                    |         |
| Chinese (n = 263)                                                                                                                                   | 1.08 (1.01 – 1.16) |         | 0.87 (0.24 – 3.06) |         |
| Others (n = 172)                                                                                                                                    | 1                  | 0.01    | 1                  | 0.82    |
| Highest level of education                                                                                                                          |                    |         |                    |         |
| Others (n = 210)                                                                                                                                    | 1                  |         | 1                  |         |
| Degree and higher (n = 237)                                                                                                                         | 1.07 (1.01 – 1.14) | 0.02    | 0.68 (0.27 – 1.69) | 0.41    |
| Religious affiliation (2 groups)                                                                                                                    |                    |         |                    |         |
| Islam (n = 94)                                                                                                                                      | 1                  |         | 1                  |         |
| Others (n = 353)                                                                                                                                    | 1.16 (1.05 – 1.28) | <0.001  | 1.80 (0.49 – 6.57) | 0.37    |
| Current role (n = 449)                                                                                                                              |                    |         |                    |         |
| Nurse (n = 231)                                                                                                                                     | 1                  |         | 1                  |         |
| Other (n = 218)                                                                                                                                     | 1.09 (1.02 – 1.15) | 0.007   | 3.17 (1.27 – 7.93) | 0.014   |
| Involvement in transplant work                                                                                                                      |                    |         |                    |         |
| No (n = 283)                                                                                                                                        | 1                  |         | 1                  |         |
| Yes (n = 150)                                                                                                                                       | 1.08 (1.02 – 1.14) | 0.008   | 3.01 (0.96 – 9.43) | 0.06    |
| Years working in Outram campus                                                                                                                      |                    |         |                    |         |
| 0 – 5 years (n = 305)                                                                                                                               | 1                  |         |                    |         |
| >5 years (n = 138)                                                                                                                                  | 1.05 (0.99 – 1.11) | 0.15    | -                  |         |
| Have you seen, read or heard of skin donation?                                                                                                      |                    |         |                    |         |
| No (n = 155)                                                                                                                                        | 1                  |         | 1                  |         |
| Yes (n = 292)                                                                                                                                       | 1.09 (1.02 – 1.17) | 0.008   | 2.16 (0.97 – 4.82) | 0.06    |
| Are you willing to discuss about tissue donation with your family?                                                                                  |                    |         |                    |         |
| No (n = 79)                                                                                                                                         | 1                  |         | 1                  |         |
| Yes (n = 368)                                                                                                                                       | 1.34 (1.16 – 1.55) | <0.001  | 3.12 (1.19 – 8.22) | 0.02    |
| If you didn't know your family member's wishes on tissue donation, how likely would you donate his or her tissues upon death, if it were up to you? |                    |         |                    |         |
| Unlikely (n = 211)                                                                                                                                  | 1                  |         | 1                  |         |
| Likely (n = 238)                                                                                                                                    | 1.15 (1.08 – 1.22) | <0.001  | 2.05 (0.69 – 6.09) | 0.19    |
| If a family member had expressed interest in donating his or her tissues upon death, how likely would you donate if it were up to you?              |                    |         |                    |         |
| Unlikely (n = 55)                                                                                                                                   | 1                  |         | 1                  |         |
| Likely (n = 394)                                                                                                                                    | 1.49 (1.22 – 1.82) | <0.001  | 3.23 (1.20 – 8.64) | 0.02    |
| If skin and heart valves were legislated under presumed consent, will you:                                                                          |                    |         |                    |         |
| Opt out (n = 124)                                                                                                                                   | 1                  |         | 1                  |         |
| Do nothing (n = 321)                                                                                                                                | 1.17 (1.07 – 1.27) | <0.001  | 2.66 (1.19 – 5.92) | 0.02    |

\*Reference group.

Table 4. Association between Support for Heart Valve Donation for Transplantation and Demographic, Educational, Professional and Psychosocial Factors and Willingness in Donation

| Factor                                                                                                                                              | Unadjusted          |         | Adjusted            |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------|---------------------|---------|
|                                                                                                                                                     | OR (95% CI)         | P Value | OR (95% CI)         | P Value |
| Nationality                                                                                                                                         |                     |         |                     |         |
| Singaporean (n = 323)                                                                                                                               | 0.93 (0.34 – 2.53)  |         |                     |         |
| Permanent resident (n = 55)                                                                                                                         | 0.99 (2.54 – 3.90)  |         |                     |         |
| Foreigner (n = 69)                                                                                                                                  | 1                   | 0.98    | -                   |         |
| Gender                                                                                                                                              |                     |         |                     |         |
| Male (n = 66)                                                                                                                                       | 0.98 (0.90 – 1.06)  |         |                     |         |
| Female (n = 371)                                                                                                                                    | 1*                  | 0.61    | -                   |         |
| Age by group                                                                                                                                        |                     |         |                     |         |
| 18 – 24 (n = 128)                                                                                                                                   | 2.36 (0.64 – 10.78) |         |                     |         |
| 25 – 34 (n = 190)                                                                                                                                   | 4.91 (1.18 – 20.44) |         |                     |         |
| 35 – 44 (n = 70)                                                                                                                                    | 2.86 (0.62 – 13.18) |         |                     |         |
| 45 – 54 (n = 46)                                                                                                                                    | 3.91 (0.69 – 22.09) |         |                     |         |
| ≥55 (n = 14)                                                                                                                                        | 1                   | 0.24    | -                   |         |
| Race                                                                                                                                                |                     |         |                     |         |
| Chinese (n = 262)                                                                                                                                   | 1.06 (1.01 – 1.13)  |         | 0.43 (0.09 – 1.99)  |         |
| Others (n = 172)                                                                                                                                    | 1                   | 0.04    | 1                   | 0.28    |
| Highest level of education                                                                                                                          |                     |         |                     |         |
| Others (n = 210)                                                                                                                                    | 1                   |         | 1                   |         |
| Degree and higher (n = 236)                                                                                                                         | 1.06 (1.00 – 1.12)  | 0.048   | 0.83 (0.32 – 2.18)  | 0.71    |
| Religious affiliation (2 groups)                                                                                                                    |                     |         |                     |         |
| Islam (n = 94)                                                                                                                                      | 1                   |         | 1                   |         |
| Others (n = 352)                                                                                                                                    | 1.13 (1.03 – 1.23)  | 0.002   | 2.26 (0.48 – 10.62) | 0.30    |
| Current role (n = 449)                                                                                                                              |                     |         |                     |         |
| Nurse (n = 231)                                                                                                                                     | 1                   |         | 1                   |         |
| Other (n = 217)                                                                                                                                     | 1.06 (1.01 – 1.12)  | 0.031   | 3.17 (1.18 – 8.50)  | 0.02    |
| Involvement in transplant work                                                                                                                      |                     |         |                     |         |
| No (n = 297)                                                                                                                                        | 1                   |         | 1                   |         |
| Yes (n = 150)                                                                                                                                       | 1.08 (1.03 – 1.13)  | 0.004   | 2.77 (0.79 – 9.59)  | 0.11    |
| Years working in Outram campus                                                                                                                      |                     |         |                     |         |
| 0 – 5 years (n = 305)                                                                                                                               | 1                   |         |                     |         |
| >5 years (n = 137)                                                                                                                                  | 1.04 (0.98 – 1.09)  | 0.24    | -                   |         |
| Have you seen, read or heard of heart valves donation?                                                                                              |                     |         |                     |         |
| No (n = 226)                                                                                                                                        | 1                   |         | 1                   |         |
| Yes (n = 220)                                                                                                                                       | 1.08 (1.02 – 1.13)  | 0.005   | 2.77 (1.32 – 9.09)  | 0.01    |
| Are you willing to discuss about tissue donation with your family?                                                                                  |                     |         |                     |         |
| No (n = 79)                                                                                                                                         | 1                   |         | 1                   |         |
| Yes (n = 367)                                                                                                                                       | 1.21 (1.08 – 1.37)  | <0.001  | 2.08 (0.76 – 5.74)  | 0.15    |
| If you didn't know your family member's wishes on tissue donation, how likely would you donate his or her tissues upon death, if it were up to you? |                     |         |                     |         |
| Unlikely (n = 210)                                                                                                                                  | 1                   |         | 1                   |         |
| Likely (n = 238)                                                                                                                                    | 1.12 (1.06 – 1.19)  | <0.001  | 2.79 (0.81 – 9.60)  | 0.10    |
| If a family member had expressed interest in donating his or her tissues upon death, how likely would you donate if it were up to you?              |                     |         |                     |         |
| Unlikely (n = 55)                                                                                                                                   | 1                   |         | 1                   |         |
| Likely (n = 393)                                                                                                                                    | 1.38 (1.16 – 1.65)  | <0.001  | 4.38 (1.54 – 12.48) | 0.006   |
| If skin and heart valves were legislated under presumed consent, will you:                                                                          |                     |         |                     |         |
| Opt out (n = 124)                                                                                                                                   | 1                   |         | 1                   |         |
| Do nothing (n = 320)                                                                                                                                | 1.13 (1.04 – 1.22)  | <0.001  | 1.87 (0.79 – 4.44)  | 0.15    |

\*Reference group.

be statistically significantly associated with gender, current role and involvement in transplant work. Participants who were involved in transplant work were reported to be 2.43 times more likely to support tissue donation compared to those who were not involved (95% CI, 1.03 to 5.73,  $P = 0.05$ ). However, in multivariate analysis, after adjusting all demographic factors, support for tissue donation was found to be non-statistically significant due to small sample size (Table 5).

The findings of the second part of the study were reported in the ‘Evaluation of the effectiveness of the different modes of publicity used for tissue donation among healthcare professionals in Singapore’.<sup>8</sup>

## Discussion

The results of the current survey identified specific areas of concerns. Firstly, the number of healthcare professionals who had heard about skin donation was more than those who had heard about heart valve donation. This may be because the skin bank was established 11 years prior to the cardiovascular homograft bank.

Secondly, most healthcare professionals would opt out of skin donation as compared to heart valve donation if both tissues were legislated under presumed consent. This can probably be attributed to misconceptions existing among people regarding skin donation; some of these misconceptions, which we gathered informally through awareness talks with different groups of audiences include: recovery of skin from the entire body, fear of disfigurement and bloodiness, and the body will not be presentable during an open casket funeral. Unlike the American and European societies, who are generally more open to donation, our society comprising predominantly of Chinese and Malay societies have traditional cultural values, which result in greater antipathy towards organ/tissue donation.<sup>9</sup> This was evident in various studies, for instance, 27% of 2930 Chinese participants would not consent to donate their own organs after their passing due to the traditional Chinese belief of the necessity to have an intact body after death for a good afterlife.<sup>10,11</sup> Another evidence of traditional cultural values influencing people’s decision to donate tissue/organs is the statistics obtained from 2000 to 2010 by National Transplant Resource Centre, Kuala Lumpur, which reported that donation among the Malay community (the dominant ethnic group in Malaysia) contributed to only 6.36% of the total organ donation as compared to 61.86% by Chinese and 31.78% by Indians; the study cited the Malay community’s perception that their religion, Islam, did not permit them to donate tissue/organs as the primary reason for their low donation rates.<sup>12</sup>

Thirdly, although most healthcare professionals support

tissue donation, not many of them have registered to pledge for tissue donation. This attitude of healthcare professionals may be attributed to several reasons: 1) lack of awareness that tissue donation is by opt-in system (MTERA), and not an opt-out system (HOTA) for organs; 2) lack of information about what is required of them to join the registry; and 3) signing up as a pledger is not a priority.<sup>13</sup> With regard to the last reason, it might have been the same reason that caused hesitation or reluctance to donate organs/tissues—the procrastinating mindset of “can decide later in my life”. This may suggest fear, hesitation and reluctance to think about death. Therefore, this mindset leads participants to refrain from registering as tissue donors, as it requires them to face their own mortality.<sup>3</sup>

Another factor that may have attributed to the high rate of support towards donation, while, disproportionately low pledger rate is a behavioural phenomenon called deterioration of support as one moves from abstract support to the concept of donation to a more personal and concrete commitment. The most commonly cited reasons for willingness to donate are altruistic concerns of “improving someone’s quality of life” and “doing a good deed”. However, we are uncertain if such self-reports may reflect a tendency to provide socially desirable responses although their anonymity is upheld.<sup>14</sup>

Fourthly, as reported by McGlade et al, the choice of a caring profession such as nursing does not equate to a larger degree of altruism and more support to tissue donation or pro-donation behaviour.<sup>3</sup> This observation was consistent in the Singapore context as well, as participants who are nurses were 3 times less likely to donate both skin and heart valves. Ideally, critical care nurses (being the main care provider for patients, emotional support for family members, and the key to identifying potential donors) should have detailed knowledge of tissue donation. In this way, they will understand its benefits and the clinical, technical, ethical and legal aspects of donation. If nurses are not supportive due to various reasons or are not fully educated about tissue donation and transplantation, the situation of organ and tissue shortages will be difficult to address. Hence, such education should be incorporated into mandatory training in nursing school’s curriculum or new staff orientation programme.<sup>15</sup>

Fifthly, the paramount role family members play in influencing the attitude and decision-making process of individuals with regard to tissue donation was highlighted. This may be reflective of the stronger societal family values in Singapore.<sup>16</sup> Strong family influence in tissue donation is a significant factor in two aspects: firstly, the willingness to donate tissue/organs increases if family members are pro-donation; secondly, since most healthcare professionals are “silent” or “passive” supporters of tissue donation, it is

Table 5. Association between Being a Tissue Pledger and Demographic Factors and Willingness to Donate

| Factor                                                                                                                                              | Unadjusted          |         | Adjusted           |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------|--------------------|---------|
|                                                                                                                                                     | OR (95% CI)         | P Value | OR (95% CI)        | P Value |
| Nationality                                                                                                                                         |                     |         |                    |         |
| Singaporean/permanent resident (n = 379)                                                                                                            | 1                   |         |                    |         |
| Foreigner (n = 69)                                                                                                                                  | 0.30 (0.04 – 2.25)  | 0.33    | -                  | -       |
| Gender                                                                                                                                              |                     |         |                    |         |
| Male (n = 66)                                                                                                                                       | 2.60 (1.02 – 6.60)  |         | 0.45 (0.12 – 1.62) |         |
| Female (n = 372)                                                                                                                                    | 1*                  | 0.05    | 1                  | 0.22    |
| Age by group                                                                                                                                        |                     |         |                    |         |
| 18 – 44 (n = 388)                                                                                                                                   | 0.88 (0.26 – 2.90)  |         |                    |         |
| >45 (n = 60)                                                                                                                                        | 1                   | 0.74    |                    |         |
| Race                                                                                                                                                |                     |         |                    |         |
| Malay (n = 73)                                                                                                                                      | 1                   |         |                    |         |
| Others (n = 362)                                                                                                                                    | 3.63 (0.49 – 26.76) | 0.22    | -                  | -       |
| Highest level of education                                                                                                                          |                     |         |                    |         |
| ITE and below (n = 73)                                                                                                                              | 3.17 (0.39 – 25.20) |         |                    |         |
| Diploma, advanced diploma, A-level (n = 137)                                                                                                        | 0.63 (0.25 – 1.58)  | 0.25    | -                  | -       |
| Degree and higher (n = 237)                                                                                                                         | 1                   |         |                    |         |
| Religious affiliation (2 groups)                                                                                                                    |                     |         |                    |         |
| Islam (n = 94)                                                                                                                                      | 1                   |         | 1                  |         |
| Others (n = 353)                                                                                                                                    | 5.06 (0.69 – 37.31) | 0.09    | 0.31 (0.04 – 2.53) | 0.28    |
| Current role (n = 449)                                                                                                                              |                     |         |                    |         |
| Doctor/surgeon (n = 37)                                                                                                                             | 0.16 (0.03 – 0.91)  |         | 0.24 (0.02 – 2.72) |         |
| Nurse (n = 231)                                                                                                                                     | 0.54 (0.11 – 2.59)  |         | 0.29 (0.03 – 2.53) |         |
| Allied health (n = 76)                                                                                                                              | 0.23 (0.04 – 1.15)  |         | 0.19 (0.02 – 1.69) |         |
| Administration/ancillary/support (n = 105)                                                                                                          | 1                   | 0.07    | 1                  | 0.51    |
| Involvement in transplant work                                                                                                                      |                     |         |                    |         |
| No (n = 298)                                                                                                                                        | 1                   |         | 1                  |         |
| Yes (n = 150)                                                                                                                                       | 2.43 (1.03 – 5.73)  | 0.05    | 0.70 (0.25 – 19.6) | 0.50    |
| Have you seen, read or heard of skin donation?                                                                                                      |                     |         |                    |         |
| No (n = 155)                                                                                                                                        | 1                   |         |                    |         |
| Yes (n = 292)                                                                                                                                       | 1.15 (0.45 – 2.97)  | 1.00    | -                  | -       |
| Have you seen, read or heard of heart valves donation?                                                                                              |                     |         |                    |         |
| No (n = 227)                                                                                                                                        | 1                   |         | 1                  |         |
| Yes (n = 220)                                                                                                                                       | 2.41 (0.94 – 6.15)  | 0.07    | 0.47 (0.16 – 1.38) | 0.17    |
| Are you willing to discuss about tissue donation with your family?                                                                                  |                     |         |                    |         |
| No (n = 79)                                                                                                                                         | 1                   |         |                    |         |
| Yes (n = 368)                                                                                                                                       | 4.08 (0.55 – 30.3)  | 0.23    | -                  |         |
| If you didn't know your family member's wishes on tissue donation, how likely would you donate his or her tissues upon death, if it were up to you? |                     |         |                    |         |
| Unlikely (n = 211)                                                                                                                                  | 1                   |         | 1                  |         |
| Likely (n = 238)                                                                                                                                    | 2.66 (0.90 – 7.19)  | 0.06    | 0.49 (0.17 – 1.44) | 0.19    |
| If a family member had expressed interest in donating his or her tissues upon death, how likely would you donate if it were up to you?              |                     |         |                    |         |
| Unlikely (n = 55)                                                                                                                                   | 1                   |         |                    |         |
| Likely (n = 394)                                                                                                                                    | Not available†      | 0.15    | -                  | -       |

ITE: Institute of Technical Education

\*Reference group.

†No odds ratio (OR) as 1 category had 0 pledger.

all the more crucial that this intention be communicated to family members, as they will be the ones who will execute the wishes of their deceased loved ones. However, it is not in the Asian culture to discuss about death-related issues with family members, as it is regarded inauspicious. As a result, it is not uncommon for relatives to be unaware of the wishes of their family members prior to their death.<sup>17</sup> More than half of healthcare professionals surveyed stated that if they were uncertain about their deceased family member's wishes, they would be less likely to make the decision of donation if it was up to them. Previously, similar trends were also reported internationally.<sup>3</sup> In instances when family members decide not to donate, none of the incentives such as financial assistance in hospitalisation and funeral expenses or higher priority in receiving transplantation would change their decision. Conversely, if they know the deceased family members' intentions, a majority of family members would honour their wishes and consent to donation. Most healthcare professionals were willing to discuss the topic of tissue donation with their family members. During actual ground work, a potential donor's family member suggested to our transplant coordinator that our approach was incorrect; she mentioned that the coordinator should approach the potential donor when he was still alive to ascertain his wish with regard to tissue donation in the presence of other family members. Although this approach of broaching the subject of tissue donation to a potential donor during his/her final moments of life is impractical and even unethical, this suggestion reinforced the importance of communication about tissue donation during family discussions when one is healthy. Another approach is to facilitate familial decision and increase familial support towards tissue donation in the event of the patients' demise by integrating tissue donation into the end-of-life care of the patients.<sup>11</sup>

The limitations of this study are non-participation bias and convenience element, which leads to the selection of only 2 hospitals for participation. Ideally, the study subjects should consist of a randomised sample from all hospitals in Singapore. It is noteworthy that despite high education levels and being in the healthcare industry, most healthcare professionals still had inadequate knowledge about tissue donation. This lack of knowledge about tissue donation can be judged from the significant reasons for their hesitation or reluctance to donate, which they cited as: "don't know enough about tissue donation to make a decision" and "don't know how my body is treated upon donation". Therefore, through this study, a more comprehensive understanding of the psychosocial factors and attitudes of healthcare professionals, which influence tissue donation, can be gained. Thus, it will be more effective if tissue banks re-strategise educational efforts in accordance with the target audiences, addressing areas of personal motivation

of these potential donors to increase willingness to donate tissue/organs,<sup>18</sup> and clarifying specific misconceptions and concerns that they may have. This is consistent with the belief that "correct information associated with tissue donation" will increase the willingness to donate tissue/organs.

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## Appendix 1

### Part 1 of the Survey Questionnaire on Healthcare Professionals' Beliefs and Willingness on Tissue Donation

#### Demographics Information:

(a) Nationality: ☐ Singaporean ☐ Permanent Resident ☐ Foreigner

(b) Gender: ☐ Male ☐ Female

(c) Age:

☐ 18 – 19 ☐ 20 – 24 ☐ 25 – 29 ☐ 30 – 34 ☐ 35 – 39 ☐ 40 – 44

☐ 45 – 49 ☐ 50 – 54 ☐ 55 – 59 ☐ 60 – 64 ☐ 65 – 69 ☐ 70 – 74

☐ 75 – 79 ☐ 80 – 84 ☐ 85 years and over

(d) Race: ☐ Chinese ☐ Malay ☐ Indian ☐ Others (Please specify): \_\_\_\_\_

(e) Religious Affiliation: ☐ Buddhism ☐ Catholicism / Christianity ☐ Hinduism ☐ Islam

☐ Others (Please specify): \_\_\_\_\_

(f) Highest Level of Education Qualification Obtained:

☐ No formal education, lower secondary, or equivalent

☐ Secondary i.e.: O' Levels, N' Levels, or equivalent

☐ A' Levels, or equivalent

☐ National ITE Certificate (NITEC), Higher NITEC, or equivalent

☐ Polytechnic Diploma, or equivalent

☐ Higher/Advanced Diploma, or equivalent

☐ Bachelor Degree

☐ Post Graduate Diploma or Degree e.g.: Masters or PhD, or higher

(g) What is your current role : ☐ Doctor ☐ Nurse

☐ Allied Health: State designation: \_\_\_\_\_

☐ Administration / Ancillary / Support: State designation: \_\_\_\_\_

(If your answer is Doctor / Nurse / Allied Health proceed to Q(h). Else proceed to Q(i))

(h) How long have you been in this role? \_\_\_\_\_

(i) How long have you been working at Outram Campus? \_\_\_\_\_

(j) Are you / have you ever been involved in transplant work? ☐ Yes ☐ No

If Yes, what is your major aspect of involvement? :

☐ Patient Care ☐ Communications/Publications ☐ Research

☐ Others (Please specify): \_\_\_\_\_

### Questions:

1. Do you support the donation of human skin for transplantation?

- ☐ Support    ☐ Somewhat Support    ☐ Somewhat Oppose    ☐ Oppose

2. Do you support the donation of human heart valves for transplantation?

- ☐ Support    ☐ Somewhat Support    ☐ Somewhat Oppose    ☐ Oppose

3. Have you signed up as a tissue pledger?    ☐ Yes    ☐ No

4. How willing are you to donate your skin and / or heart valve tissues upon death?

(I) Skin:

- ☐ Willing    ☐ Somewhat willing    ☐ Somewhat unwilling    ☐ Unwilling

(II) Heart Valves:

- ☐ Willing    ☐ Somewhat willing    ☐ Somewhat unwilling    ☐ Unwilling

(If both answers are "Willing", proceed to Question 7. Else, proceed to Question 5.)

5. Select 2 important reasons why you are still considering or are unwilling to donate:

- ☐ I am unhealthy
- ☐ Don't want my tissues to be used for research
- ☐ Can decide this in the later part of my life
- ☐ Others will donate
- ☐ Don't know how my body is treated upon donation
- ☐ Against my religious views
- ☐ Don't know enough about tissue donation to make a decision
- ☐ Don't want my body to be disfigured
- ☐ Others (Please specify): \_\_\_\_\_

6. Select 2 important beliefs that will most likely increase your willingness to donate:

- ☐ Family members support donation
- ☐ Religion supports donation
- ☐ Donation helps surviving family members cope with grief
- ☐ Fair access to receiving a transplantation (e.g.: regardless of poor / rich)
- ☐ Correct information associated with tissue donation (e.g.: tissue donor families do not pay extra medical bills for the purpose of donation)
- ☐ Health care providers place the interest of the dying patient above tissue donation
- ☐ Others (Please specify): \_\_\_\_\_ (Proceed to Question 9)

7. Select 2 important reasons why you are willing to donate:

- ☐ To set a good example                      ☐ I am compelled to do it
- ☐ To improve someone's quality of life   ☐ To put my tissues to the maximum use
- ☐ To do a good deed                      ☐ I knew a friend/ family member who needed tissue transplant
- ☐ Others (Please specify): \_\_\_\_\_

8. How willing are you to discuss your wish about tissue donation with your family?

- ☐ Very willing   ☐ Somewhat willing   ☐ Somewhat unwilling   ☐ Very unwilling

9. If you didn't know your family member's wishes on tissue donation, how likely would you donate his or her tissues upon death, if it were up to you?

- ☐ Very Likely   ☐ Somewhat Likely   ☐ Somewhat Unlikely   ☐ Very Unlikely

10. If a family member had expressed interest in donating his or her tissues upon death, how likely would you donate if it were up to you?

- ☐ Very Likely   ☐ Somewhat Likely   ☐ Somewhat Unlikely   ☐ Very Unlikely

(If your answer is "Very likely" or "Somewhat likely", proceed to Question 12. Else proceed to Question 11.)

11. If you are the family of the deceased, which of the following may best increase your willingness to tissue donation?

- ☐ Assistance in funeral expenses                      ☐ Assistance in hospitalisation bills
- ☐ Thank you card from tissue recipient                      ☐ Condolences flowers
- ☐ Higher priority to receive tissue transplantation
- ☐ None of the above, my decision will still be the same
- ☐ Others (Please specify): \_\_\_\_\_

12. If skin and heart valves were legislated under presumed consent, will you:

- ☐ Opt out on both tissues                      ☐ Opt out on skin donation
- ☐ Opt out on heart valve donation                      ☐ Do nothing, as I support tissue donation