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Research paper

# Mixed-mode versus paper surveys for patient-reported outcomes after critical illness: A randomised controlled trial

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ABSTRACT

*Objective:* The aim of the study was to determine the response rate to a mixed-mode survey using email compared with that to a paper survey in survivors of critical illness.
*Design:* This is a prospective randomised controlled trial.
*Setting:* The study was conducted at a single-centre quaternary intensive care unit (ICU) in Adelaide, Australia.
*Participants:* Study participants were patients admitted to the ICU for ≥48 h and discharged from the hospital.
*Interventions:* The participants were randomised to receive a survey by paper (via mail) or via online (via email, or if a non-email user, via a letter with a website address). Patients who did not respond to the initial survey received a reminder paper survey after 14 days. The survey included quality of life (EuroQol-5D-5L), anxiety and depression (Hospital Anxiety and Depression Scale), and post-traumatic symptom (Impact of Event Scale-Revised) assessment.
*Main outcome measures:* Survey response rate, extent of survey completion, clinical outcomes at different time points after discharge, and survey cost analysis were the main outcome measures. Outcomes were stratified based on follow-up time after ICU discharge (3, 6, and 12 months).
*Results:* A total of 239 patients were randomised. The response rate was similar between the groups (mixed-mode: 78% [92/118 patients] vs. paper: 80% [97/121 patients], p = 0.751) and did not differ between time points of follow-up. Incomplete surveys were more prevalent in the paper group (10% vs 18%). The median EuroQol-5D-5L index value was 0.83 [0.71−0.92]. Depressive symptoms were reported by 25% of patients (46/187), anxiety symptoms were reported by 27% (50/187), and probable post-traumatic stress disorder was reported by 14% (25/184). Patient outcomes did not differ between the groups or time points of follow-up. The cost per reply was AU$ 16.60 (mixed-mode) vs AU$ 19.78 (paper).
*Conclusion:* The response rate of a mixed-mode survey is similar to that of a paper survey and may provide modest cost savings.


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## 1. Introduction

Survivors of critical illness are at risk of reduced quality of life[1–3] and mental health,[4–6] which are often quantified by using patient-reported outcome measures (PROMs). PROMs have largely been collected using telephone or paper mail surveys.[1,2,4] Telephone surveys are time-consuming, require data entry, and are costly.[7,8] Paper surveys, although less expensive, still incur postage costs, also require data entry, and have a slower turnaround time.[9,10]

Online surveys for PROMs have been in use since 1996[11] and are an increasingly attractive choice, given the prevalence of internet use,[12] ease of administering surveys, convenience for patients, and lower cost.[9,13] However, prior studies also show that strictly online surveys frequently return a lower response rate than other modalities (e.g., paper/phone).[9,13,14] The combination of an online component and paper mail in a mixed-mode survey is an established strategy,[15,16] but it is unknown whether this will enable a greater response rate from survivors of critical illness.

The primary objective of this study was to determine the response rate to a mixed-mode PROM survey compared with that to a paper mail survey in adult survivors of critical illness. Our hypothesis was that the mixed-mode survey would have a higher response rate than the paper survey. Secondarily, we sought to assess the extent of survey completion of each modality, report the PROM outcomes, perform a cost analysis of the survey modalities, and describe the characteristics of participants.

## 2. Methods

A prospective randomised controlled trial was conducted to assess the response rate to a PROM survey delivered via two different modalities. The study was approved by the Royal Adelaide Hospital Research Ethics Committee (HREC/18/CALHN/549) and prospectively registered on the Australian and New Zealand Clinical Trials Registry (ACTRN12619000586112). Patients were contacted by letter between May and July 2019 to obtain written consent. Surveys were sent between June and August 2019, and data collection was completed by September 2019.

### 2.1. Study population, subgroups, and recruitment

All adult (≥18 years of age) patients discharged from the Royal Adelaide Hospital intensive care unit (ICU) between June 2018 and April 2019 who had spent at least 48 h in the ICU and who were still alive at the time of recruitment were identified retrospectively from the Australia and New Zealand Intensive Care Society Adult Patient Database[17] and cross-referenced with the South Australian Death Registry.

Potential patients were separated *a priori* into three subgroups (follow-up at 3, 6, or 12 months) based on the duration since ICU discharge. Patients were eligible only if their respective follow-up date occurred during the recruitment period from May to July 2019. A letter describing this follow-up study and requesting consent to participate was sent 3 weeks before the follow-up date and were batch mailed on a weekly basis. The letter omitted details of the survey modalities so as to maintain participant blinding.

### 2.2. Consent

Patients were asked to return a completed consent form and an email address if they had one; however, this had no bearing on group allocation. Failure to return the consent letter resulted in a telephone reminder call after 10 days.

### 2.3. Data collection

Demographic details including age, sex, and the state of residence were extracted from the Adult Patient Database.

Three PROMs were administered via both modalities. Quality of life was assessed using the EuroQol-5D-5L (EQ-5D-5L), measuring quality of life over five domains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.[18] EQ-5D-5L index values were calculated using a UK value set.[19] Anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS).[18] For each domain of anxiety and depression in the HADS, a score of 8–10 was classified as mild, 11–14 was classified as moderate, and >14 was classified as severe.[20] Impact of Event Scale-Revised (IES-R) was used to assess post-traumatic stress symptoms,[18] with a cut-off of >35 used to define a patient as likely having post-traumatic stress disorder (PTSD).[21] Patients were also asked to rate their ability to complete surveys using paper, online, and using a smartphone app (five-point Likert scale) (Supplementary material).

### 2.4. Sample size and study group allocation

An estimated 600 patients were to be contacted within the predefined recruitment period with an aim of obtaining a convenience sample of 300 responses based on the response rates of previous ICU follow-up studies.[4,5,22]

After consent, the patients were computer randomised[23] in a 1:1 allocation to the mixed-mode or paper group. The surveys were sent out within a week of each patient's follow-up date, allowing for the constraints of the hospital mailing service. Patients were blinded to their group allocation; however, clinicians and researchers were not.

### 2.5. Interventions and study groups

In the mixed-mode group, patients were emailed a website link to the survey; patients without email received a letter with a simple website address and a unique login. Email users were sent automated reminder emails after 3, 6, and 9 days. Forced responses were used in the online survey, requiring each question to be answered to progress.[24,25] The online survey was administered using the Research Electronic Data Capture platform (REDCap; Vanderbilt University, Tennessee, USA),[26] with question order and wording identical to that of the paper modality. In the paper group, patients received a paper survey with a postage-paid reply envelope.

In both groups, patients who had not completed their survey received a reminder paper survey after 14 days and a reminder phone call to return their received survey after 21 days.

### 2.6. Outcome measures

The primary outcome was the response rate to the survey, calculated as the number of respondents as a proportion of consented patients in each group. A returned survey was considered valid if any PROM question was answered.

Secondary outcomes were the response rate between patients with and without email in the mixed-mode group and response rate before the reminder paper survey in both groups, the extent of survey

completion (number of surveys missing at least one answer, number of individual questions without an answer), PROM outcomes between groups and subgroups, survey costs, staff resources, and characteristics (age, sex, Acute Physiology and Chronic Health Evaluation II score, length of stay [LOS] in the ICU, LOS in the hospital) of patients who provided a survey response.

### 2.7. Statistical analysis

Categorical variables were reported as frequency and percentages; normally distributed continuous variables were reported as mean and standard deviation (SD); median and interquartile range were reported for non-normal continuous variables. Categorical data were analysed using chi-square tests, parametric data were analysed using two-sided t-tests, and non-parametric data were analysed using Kruskal–Wallis rank tests. Missing data in the EQ-5D-5L excluded calculation of an index value. Missing data from the HADS[27] and IES-R[4] were imputed as the mean of individual patient subscale scores. Significance was set as a p-value of 0.05. All analyses were performed using Stata v15 (College Station, TX, USA).

## 3. Results

### 3.1. Study population

There were 1796 patients discharged between June 2018 and April 2019, with 825 having an ICU LOS of at least 48 h and who were still alive at the time of follow-up. Of these, all 646 who had a

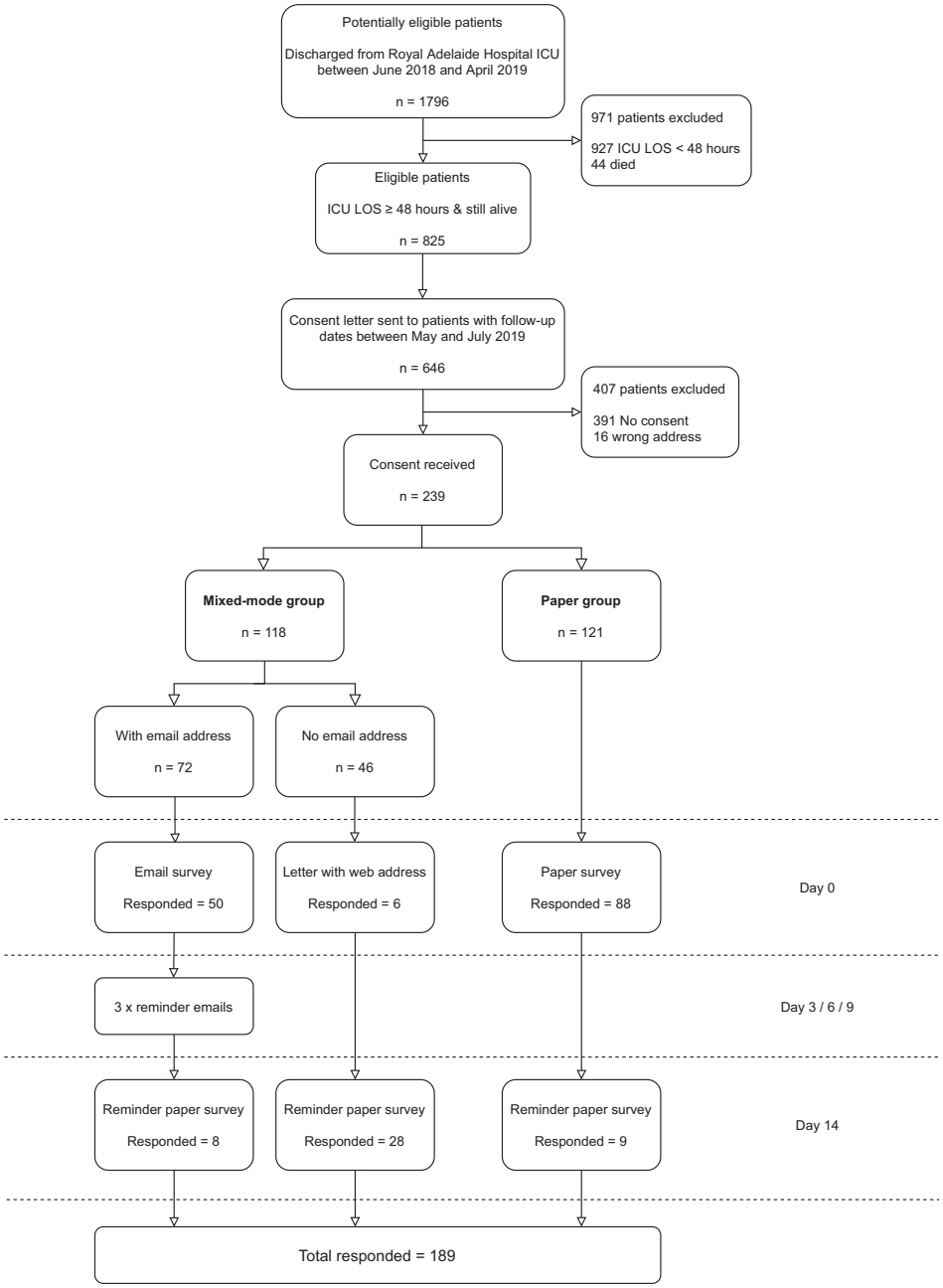


**Fig. 1.** CONSORT diagram. ICU = intensive care unit, LOS = length of stay.

follow-up date of 3, 6, or 12 months after ICU discharge within the recruitment period were contacted, and 239 (37%) consented to participate (Fig. 1). Of the consented patients, 57 (48%) in the mixed-mode group and 62 (51%) in the paper group required a phone call reminder to return their completed consent form.

Forty-four (18%) patients were surveyed 3 months after ICU discharge, 87 (36%) were surveyed at 6 months after ICU discharge, and 108 (45%) were surveyed at 12 months after ICU discharge.

### 3.2. Randomisation

There were 118 (49%) patients randomised to the mixed-mode group, and 121 (51%) were randomised to the paper group (Fig. 1). In the mixed-mode group, 39% (46/118) of patients had no email and received a letter with a simple website address and a unique login.

### 3.3. Response rate to the survey

Survey responses were received from 189 (79%) patients. The characteristics of responders stratified by study group are shown in Table 1; the characteristics of responders stratified by subgroup are shown in Supplementary Table S1.

The response rate was 78% (92/118) in the mixed-mode group and 80% (97/121) in the paper group (p = 0.751) (Fig. 2). Two patients in the mixed-mode group replied without answering any PROM questions and were classified as nonresponders.

The response rate before the reminder paper survey was higher in the paper group than in the mixed-mode group (73% vs. 48%, respectively, p < 0.001) (Fig. 2). In the mixed-mode group, the response rate before the reminder paper survey was higher in those who used email than in those who did not (69% vs 13%, respectively, p < 0.001).

Response rates between the 3-, 6-, and 12-month subgroups were similar (Supplementary Table S2).

### 3.4. Survey completion

The proportion of respondents in the paper group with at least one answer missing was more (17/97, 18%) than that in the mixed-mode group (9/92, 10%). Conversely, there were more missing answers in the mixed-mode group than in the paper group (3.4% vs 1.3%, respectively) owing to premature survey termination (Table 2, Supplementary Table S5). Of the nine patients with missing data in the mixed-mode group, five (56%) responded via the reminder paper survey and four (44%) responded online; these four terminated the survey prematurely.

Despite imputation for missing data with the HADS and IES-R, a total of four EQ-5D-5L, two HADS, and five IES-R responses could not be analysed as there were insufficient data. Of these 11 PROMs, seven were from the mixed-mode group and four were from the paper group. Across both groups, IES-R had the highest number of

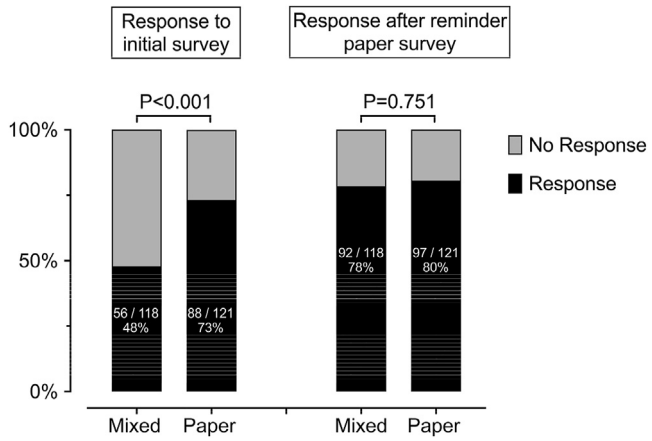


**Figure 2.** Response rate results between modalities before and after the reminder paper survey.

respondents with any missing answers and the most total missing answers of all the PROMs (Table 2).

### 3.5. Patient-reported outcome measures

Quality of life, the presence of anxiety and depression, and PTSD symptoms are reported in Table 3. Measures of PROMs neither were significantly different between the study groups (Table 3) nor changed with duration since ICU discharge (Supplementary Table S3).

### 3.6. Cost analysis

The cost of each survey reply was AU$ 16.60 in the mixed-mode group and AU$ 19.78 in the paper group (Supplementary material).

### 3.7. Factors associated with a survey response

The only patient characteristic associated with survey response was older age (responder: 67 [57–75] years vs. nonresponder: 58 [45–69] years; p < 0.001); this did not differ between the study groups (Supplementary Table S4).

### 3.8. Contact preferences of responders

On a five-point Likert scale, 88% (167/189) of respondents considered themselves fully able to complete a postal survey, but only 49% (91/186) were fully able to complete an online survey. Overall, 44% (83/189) did not use email, and of these, 70% (58/83) were completely unable to respond online.

Smartphones were owned by 54% of respondents; 46% indicated they were able to install an app, whereas only 31% stated they were

**Table 1**
Characteristics of survey responders and stratified by study groups.

| Characteristics | All responders (n = 189) | Mixed-mode group (n = 92) | Paper group (n = 97) |
|---|---|---|---|
| Age (years), median [IQR] | 67.3 [57.1–75.2] | 66.9 [54.2–76.4] | 67.6 [59.7–73.8] |
| Male, n (%) | 117 (61.9%) | 58 (63%) | 59 (60.8%) |
| APACHE II, median [IQR] | 15 [12–18] | 14.5 [11–18] | 15 [13–18] |
| APACHE III, median [IQR] | 54 [44–67] | 53 [43–67] | 56 [46–67] |
| ICU LOS (days), median [IQR] | 3.9 [2.9–5.9] | 3.8 [2.9–5.7] | 4 [3–6] |
| Hospital LOS (days), median [IQR] | 11.2 [8.1–22.2] | 13.2 [8.7–20.6] | 10.1 [7.7–22.6] |
| Lives in SA, n (%) | 175 (92.6%) | 86 (93.5%) | 89 (91.8%) |

APACHE = Acute Physiology and Chronic Health Evaluation, ICU = intensive care unit, IQR = interquartile range, LOS = length of stay, SA = South Australia.

**Table 2**
Missing data stratified by patient-reported outcome measures and study groups. All data are n (%).

| PROM | Questions per PROM | All responders | | Mixed-mode group | | Paper group | |
|---|---|---|---|---|---|---|---|
| | | Number of patients with missing answers (n = 189) | Number of missing answers | Number of patients with missing answers (n = 92) | Number of missing answers | Number of patients with missing answers (n = 97) | Number of missing answers |
| EQ-5D-5L | 6 | 6 (3.2%) | 16 (1.4%) | 2 (2.2%) | 7 (1.3%) | 4 (4.1%) | 9 (1.5%) |
| HADS | 14 | 6 (3.2%) | 33 (1.2%) | 2 (2.2%) | 28 (2.2%) | 4 (4.1%) | 5 (0.4%) |
| IES-R | 22 | 21 (11.1%) | 135 (3.2%) | 9 (9.8%) | 96 (4.7%) | 12 (12.4%) | 39 (1.8%) |
| All PROMs | 42 | 26 (13.8%) | 184 (2.3%) | 9 (9.8%) | 131 (3.4%) | 17 (17.5%) | 53 (1.3%) |

EQ-5D-5L = EuroQOL-5D-5L, HADS = Hospital Anxiety and Depression Scale, IES-R = Impact of Event Scale-Revised, PROM = patient-reported outcome measure.
All data are represented as n (%).

fully able to complete a survey on this. These responses were similar between the study groups.

## 4. Discussion

This study shows that a mixed-mode PROM survey has a similar response rate to that of a paper survey (78% vs 80%) in survivors of critical illness. The recognised reduced response rates in online-only surveys[13,28] made the mixed-mode approach the practical choice; however, even this method has been inconsistent when compared with paper or phone modalities;[29–31] hence, this study was undertaken to establish the potential of this method in survivors of critical illness. The equivalent response rate of our mixed-mode group may have been in part due to the multiple reminders and the high prevalence of internet and smartphone device use in Australia.[12,32] Although the mixed-mode group was designed primarily to be an online survey group, 39% of the group responded via a reminder paper survey, demonstrating the absolute importance in providing patients the option of a traditional modality.[29]

The overall response rate of 29% for all contacted patients was lower than what we anticipated but still comparable with other studies.[2,5,33] The ethics committee mandated a returned signed consent, which may have reduced our overall response rate.[34] Other novel strategies to improve response rates include the use of mobile texting as a reminder[35,36] and the use of a mobile[37] or tablet app[38] for the administration of the survey.

The initial response rate in those without email in the mixed-mode group who were sent a letter with a website address was only 13%. Individuals without email were older, and their reduced online response was in keeping with Australian statistics showing internet use decreasing with age.[12] It is likely that if patients did not use email, their access or ability to use a connected device would be limited; this was supported by the majority of patients without email indicating their inability to reply online. However, the response rate before the reminder paper survey was very similar between the email patients of the mixed-mode group (70%) and those of the paper group (73%), supporting the utility of an online survey in email users.

Survey completion was affected by the survey modality. Forced responses in the online survey had a contradictory effect by reducing the number of patients with missing data but increasing the number of survey dropouts as a result of any unanswered question resulting in all subsequent questions also being left unanswered.[39,40] As a consequence, the total percentage of missing answers was higher in the mixed-mode group. The IES-R questionnaire had the most missing answers, possibly resulting from a combination of factors including survey fatigue due to its terminal placement in the survey, the length of the IES-R questionnaire, and premature survey termination in the online survey.

The median EQ-5D-5L index value for our cohort was 0.83 [0.71–0.92] compared with 0.86 [0.66–0.95] in an Australian ICU follow-up study of 2492 ventilated patients[41] and 1.0 in a younger general Australian population.[42] The rates of anxiety, depression, and PTSD were consistent with those reported in another Australian ICU follow-up study,[1] demonstrating the validity of our outcome data in the context of our survey methodology. These rates however were lower than those reported in a similar UK[5] and Dutch[4] study, possibly reflecting different patient cohorts and healthcare systems.

The mixed-mode group offered a saving of AU$ 3.17 (16%) per reply which was received owing to lower postage and staff costs; this is in keeping with that reported in previous studies albeit at different magnitudes.[8,9,43] The lower costs and similar response

**Table 3**
Patient-reported outcome measures for survey responders and stratified by study groups.

| Patient-reported outcome measure | Total responders (n = 189) | Mixed-mode group (n = 92) | Paper group (n = 97) | P-value |
|---|---|---|---|---|
| EQ-5D-5L index value, median [IQR][a] | 0.83 [0.71–0.92] | 0.83 [0.74–0.90] | 0.83 [0.70–0.92] | 0.204 |
| EQ-5D VAS, median [IQR] | 75 [70–88] | 75 [60–90] | 80 [70–85] | 0.463 |
| Total depression, n (%)[b] | 46 (24.6%) | 24 (26.7%) | 22 (22.7%) | 0.572 |
| Mild, n (%) | 32 (17.1%) | 17 (18.9%) | 15 (15.5%) | |
| Moderate, n (%) | 13 (7%) | 7 (7.8%) | 6 (6.2%) | |
| Severe, n (%) | 1 (0.5%) | 0 (0%) | 1 (1.0%) | |
| Total anxiety, n (%)[b] | 50 (26.7%) | 25 (27.8%) | 25 (25.8%) | 0.507 |
| Mild, n (%) | 25 (13.4%) | 11 (12.2%) | 14 (14.4%) | |
| Moderate, n (%) | 20 (10.7%) | 12 (13.3%) | 8 (8.2%) | |
| Severe, n (%) | 5 (2.7%) | 2 (2.2%) | 3 (3.1%) | |
| PTSD likely, n (%)[c] | 25 (13.6%) | 13 (14.8%) | 12 (12.5%) | 0.505 |

EQ-5D-5L = EuroQOL-5D-5L, HADS = Hospital Anxiety and Depression Scale, VAS = visual analogue scale, IQR = interquartile range, IES-R = Impact of Event Scale-Revised, PTSD = post-traumatic stress disorder.
[a] EQ-5D-5L index values were calculated using a UK value set.[19]
[b] HADS = A score of 8–10 was classified as mild, 11–14 was classified as moderate, and >14 was classified as severe symptoms.[20]
[c] IES-R with a cut-off of >35 for the patient likely having PTSD.[21]

rates in the mixed-mode group would be advantageous for future studies.[29]

The strengths of this study lie in the use of best practices in conducting the mixed-mode survey using a multimodal approach with a combination of electronic and paper surveys, telephone reminders,[16,43] the use of widely adopted PROMs,[3,4,18] the different time frames in which the patients were contacted after ICU discharge, the conduct of a cost analysis, and the relatively large number of respondents.

This study had some inherent limitations. Owing to the relatively low overall response rate, the risk of nonresponder bias must be considered although low response rates are not always predictive of this.[44,45] This study is underpowered to detect small longitudinal changes in outcomes, and a potentially superior method would be to follow up a cohort over a period of time.[5,33] The email patients had more contact points (three reminder emails) than the other patients; however, this is common with an online survey[9,24,35] and it would be impractical and costly to replicate this for patients receiving paper mail. The incidence of missing data is another potential source of bias; however, the use of imputed scores, the low number of PROMs that could not be analysed, and the coherence of our outcomes with Australian data[1,41] minimise this risk. In addition, demographic data such as socioeconomic status and educational background were not recorded to assess for differences in the patients who responded online versus on paper; however, all patients in the mixed-mode group had the opportunity to reply via reminder paper survey, and the final response rates between both groups were similar. The patient characteristics and PROM outcome data were also very similar, making any response bias from differing modalities unlikely.

Based on the findings, a more effective survey methodology would be to collect email addresses during admission, to contact patients via email where possible,[29] to avoid using forced responses in the online survey,[39,40] and to use paper surveys for patients without email and nonresponders.[43,46]

## 5. Conclusion

In this single-centre study of adult survivors of critical illness, the use of a mixed-mode survey had a similar response rate when compared with a paper survey, and the mixed-mode survey is a viable and cost-effective strategy especially for patients who use email. Further refinement of this methodology to follow up survivors of critical illness may reduce the cost of future studies.

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## CRediT authorship contribution statement

**Hao Wong**: Conceptualisation, Methodology, Investigation, Data curation, Writing – original draft, Writing – review & editing. **Maarten Brusseleers**: Conceptualisation, Methodology, Investigation, Data curation, Writing – review & editing. **Kelly A Hall**: Formal analysis, Writing – review & editing. **Matthew Maiden**: Conceptualisation, Supervision, Visualisation, Writing – review & editing. **Lee-anne Chapple**: Methodology, Writing – review & editing. **Marianne Chapman**: Conceptualisation, Supervision, Writing – review & editing. **Carol Hodgson**: Methodology, Writing – review & editing. **Samuel Gluck**: Conceptualisation, Methodology, Supervision, Writing – review & editing

## Conflict of interest

None.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.aucc.2021.04.006.

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**Mixed-mode versus paper surveys for patient reported outcomes after critical illness: a randomised controlled trial**

**Supplementary Material**

**Contact preferences questionnaire sent to patients in addition to PROMs**

Do you own a smartphone? Yes | No

Are you able to install an app on your phone? Yes | No

For the questions below, please indicate on the 5-point scale how capable you are with completing questionnaires in the following manner

1 - Not able

5 - Fully able

I would be able to complete questionnaires on paper sent by the postal service

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Not able | | | | Fully able |

I would be able to complete questionnaires via an online webpage

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Not able | | | | Fully able |

I would be able to complete questionnaires on a smartphone app

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Not able | | | | Fully able |

**Cost Analysis**

Costs were calculated for:

Postage out – AU$1.16

Return postage (reply paid envelopes) – AU$0.79

Printing paper – AU 0.9 cents per sheet

Manpower – AU$26.63 per hour for Level 1 Scientist

- 1.5 minutes to print and send out each letter
- 4 minutes per phone call
- 6 minutes for data entry into computer system per paper response received

The use of the REDcap platform to send out automated emails is free.

Cost for contacting non-responders from sending out consent letters and making consent reminder phone calls were also included with even enrolment between both groups assumed (646 patients contacted = 323 patients per group)

Total cost for mixed-mode group = AU$1528 / 92 replies

= AU$16.60 per reply

Total cost for paper group = AU$1919 / 97 replies

= AU$19.78 per reply

| | Subgroups | | |
|---|---|---|---|
| | **3 months (n=36)** | **6 months (n=69)** | **12 months (n=84)** |
| **Age (years), median [IQR]** | 67.1 [61.4-72.5] | 66.1 [55.8-75.6] | 70.3 [56.5-74.5] |
| **Male, n (%)** | 24 (66.7%) | 44 (63.8%) | 49 (58.3%) |
| **APACHE II, median [IQR]** | 14.5 [11-18] | 15 [12-18] | 15 [11.8-18] |
| **APACHE III, median [IQR]** | 55 [49.8-62.3] | 52 [44-66] | 57.5 [39.8-69.3] |
| **ICU LOS (days), median [IQR]** | 3.2 [2.8-4.8] | 4 [3-6] | 4 [2.9-5.9] |
| **HOS LOS (days), median [IQR]** | 10.2 [7.9-16.4] | 10.8 [7.8-18.1] | 12.7 [8.2-26.8] |
| **SA address, n (%)** | 33 (91.7%) | 64 (92.8%) | 78 (92.9%) |

**Table S1 - Characteristics of survey responders stratified by subgroups**

APACHE – Acute Physiology and Chronic Health Evaluation, ICU LOS – Intensive Care Unit length of stay, HOS LOS – Hospital length of stay, SA – South Australia

| | 3 months | 6 months | 12 months | p value |
|---|---|---|---|---|
| **Replied / consented** | 36/44 (81.8%) | 69/87 (79.3%) | 84/108 (77.8%) | 0.855 |
| **Mixed-mode Group** | 18/36 (50%) | 30/69 (43.5%) | 44/84 (52.4%) | |
| **Paper Group** | 18/36 (50%) | 39/69 (56.5%) | 40/84 (47.6%) | |

**Table S2 – Response rate within subgroups and further stratified into mixed-mode and paper group**

| | 3 months (n=36) | 6 months (n=69) | 12 months (n=84) |
|---|---|---|---|
| **EQ-5D-5L Index Value, median [IQR]*** | 0.81 [0.74-0.94] | 0.86 [0.74-0.94] | 0.82 [0.67-0.89] |
| **EQ-5D VAS, median [IQR]** | 75 [70-90] | 80 [65-85] | 75 [60-85] |
| **Total Depression, n (%)†** | 9 (25.7%) | 16 (23.2%) | 21(25.3%) |
| **Mild, n (%)** | 6 (17.1%) | 9 (13%) | 17 (20.5%) |
| **Moderate, n (%)** | 3 (8.6%) | 7 (10.1%) | 3 (3.6%) |
| **Severe, n (%)** | 0 (0%) | 0 (0%) | 1 (1.2%) |
| **Total Anxiety, n (%)†** | 7 (20%) | 22 (31.9%) | 21 (25.3%) |
| **Mild, n (%)** | 5 (14.3%) | 8 (11.6%) | 12 (14.5%) |
| **Moderate, n (%)** | 1 (2.9%) | 12 (17.4%) | 7 (8.4%) |
| **Severe, n (%)** | 1 (2.9%) | 2 (2.9%) | 2 (2.4%) |
| **PTSD likely, n (%)‡** | 3 (8.6%) | 9 (13.2%) | 13 (16%) |

**Table S3 – Patient Reported Outcome Measures stratified by subgroup**

EQ-5D-5L – EuroQOL-5D-5L, VAS – visual analogue scale, PTSD – Post traumatic stress disorder.

* EQ-5D-5L index values were calculated using a UK value set (19)

† HADS - A score of 8-10 was classified as mild, 11-14 as moderate, and >14 as severe symptoms (20).

‡ IES-R with a cut-off of >35 for the patient likely having PTSD (21).

| | Mixed-Mode Group (n=92) | Paper Group (n=97) | Responders (n=189) | Non-responders* (n=50) |
|---|---|---|---|---|
| **Age (years), median [IQR]** | 66.9 [54.2 - 76.4] | 67.6 [59.7 - 73.8] | 67.3 [57.1-75.2] | 57.9 [44.8-69.4] |
| **Male, n (%)** | 58 (63%) | 59 (60.8%) | 117 (61.9%) | 31 (62%) |
| **APACHE II, median [IQR]** | 15 [11 - 18] | 15 [13 - 18] | 15 [12-18] | 14 [12-19] |
| **APACHE III, median [IQR]** | 53 [43 - 67] | 56 [46 - 67] | 54 [44 - 67] | 54 [37-66] |
| **ICU LOS (days), median [IQR]** | 3.8 [2.9 - 5.7] | 4.0 [3.0 - 6.0] | 3.9 [2.9 - 5.9] | 4.1 [2.9-6.9] |
| **HOS LOS (days), median [IQR]** | 13.2 [8.7 - 20.6] | 10.1 [7.7 - 22.6] | 11.2 [8.1 - 22.2] | 16.5 [10.4-23.9] |
| **Lives in SA, n (%)** | 86 (93.5%) | 89 (91.8%) | 175 (92.6%) | 48 (96%) |

**Table S4 – Characteristics of survey responders stratified by groups, all responders and non-responders**

APACHE – Acute Physiology and Chronic Health Evaluation, ICU LOS – Intensive Care Unit length of stay, HOS LOS – Hospital length of stay, SA – South Australia.

* Non-responders were all patients that consented but did not reply

| | Number (%) of answers for each question | | |
|---|---|---|---|
| **PROM** | **Mixed-mode Group (n=92)** | **Paper Group (n=97)** | **P-value** |
| **EQ-5D-5L** | | | |
| Mobility | 91 (98.9%) | 95 (97.9%) | 0.592 |
| Self-Care | 91 (98.9%) | 96 (99%) | 0.970 |
| Usual Activities | 91 (98.9%) | 96 (99%) | 0.970 |
| Pain / Discomfort | 91 (98.9%) | 96 (99%) | 0.970 |
| Anxiety / Depression | 91 (98.9%) | 95 (97.9%) | 0.592 |
| EQ-5D Visual Analogue Scale | 90 (97.8%) | 95 (97.9%) | 0.957 |
| **Number of EQ-5D-5L completed** | 90 (97.8%) | 93 (95.9%) | 0.445 |
| | | | |
| **HADS** | | | |
| Feel tense or wound up | 90 (97.8%) | 96 (99%) | 0.530 |
| Enjoyment of things | 90 (97.8%) | 96 (99%) | 0.530 |
| Frightened feeling | 90 (97.8%) | 96 (99%) | 0.530 |
| Laugh and see the funny side | 90 (97.8%) | 97 (100%) | 0.144 |
| Worrying thoughts | 90 (97.8%) | 97 (100%) | 0.144 |
| Feel cheerful | 90 (97.8%) | 97 (100%) | 0.144 |
| Sit at ease and feel relaxed | 90 (97.8%) | 97 (100%) | 0.144 |
| Feel slowed down | 90 (97.8%) | 97 (100%) | 0.144 |
| Butterflies in the stomach | 90 (97.8%) | 96 (99%) | 0.530 |
| Lost interest in appearance | 90 (97.8%) | 97 (100%) | 0.144 |
| Feel restless | 90 (97.8%) | 97 (100%) | 0.144 |
| Look forward with enjoyment | 90 (97.8%) | 96 (99%) | 0.530 |
| Sudden feeling of panic | 90 (97.8%) | 97 (100%) | 0.144 |
| Enjoy book or audio or TV | 90 (97.8%) | 97 (100%) | 0.144 |
| **Number of HADS completed** | 90 (97.8%) | 93 (95.9%) | 0.445 |

**Table S5 - Missing data stratified by individual items and PROMs.**

**All data are n (%)**

PROM – Patient Reported Outcome Measure

EQ-5D-5L – EuroQOL-5D-5L

HADS – Hospital Anxiety and Depression Scale

IES-R – Impact of Events Scale Revised

| | Number (%) of answers for each question | | |
|---|---|---|---|
| **PROM** | **Mixed-Mode Group (n=92)** | **Paper Group (n=97)** | **P-value** |
| **IES-R** | | | |
| Reminder brought back feelings | 87 (94.6%) | 95 (97.9%) | 0.220 |
| Trouble staying asleep | 86 (93.5%) | 96 (99%) | 0.046 |
| Other things make me recall | 87 (94.6%) | 91 (93.8%) | 0.826 |
| Irritable and angry | 86 (93.5%) | 95 (97.9%) | 0.128 |
| Avoided getting upset | 88 (95.7%) | 96 (99%) | 0.156 |
| Thought about it didn't mean to | 88 (95.7%) | 96 (99%) | 0.156 |
| Feel it wasn't real | 88 (95.7%) | 96 (99%) | 0.156 |
| Stayed away from reminders | 88 (95.7%) | 96 (99%) | 0.156 |
| Pictures popped into mind | 88 (95.7%) | 96 (99%) | 0.156 |
| Jumpy and easily startled | 88 (95.7%) | 96 (99%) | 0.156 |
| Tried not think about it | 88 (95.7%) | 95 (97.9%) | 0.370 |
| Not dealing with feelings | 88 (95.7%) | 95 (97.9%) | 0.370 |
| Feeling numb about it | 88 (95.7%) | 95 (97.9%) | 0.370 |
| Acting or feeling at the time | 88 (95.7%) | 96 (99%) | 0.156 |
| Trouble falling asleep | 88 (95.7%) | 96 (99%) | 0.156 |
| Waves of strong feeling | 88 (95.7%) | 96 (99%) | 0.156 |
| Tried to remove it from memory | 88 (95.7%) | 96 (99%) | 0.156 |
| Trouble concentrating | 88 (95.7%) | 94 (96.9%) | 0.648 |
| Physical reactions | 88 (95.7%) | 95 (97.9%) | 0.370 |
| Dreams about it | 88 (95.7%) | 96 (99%) | 0.156 |
| Watchful or on guard | 88 (95.7%) | 96 (99%) | 0.156 |
| Tried not to talk about it | 88 (95.7%) | 96 (99%) | 0.156 |
| **Number of IES-R completed** | 83 (90.2%) | 85 (87.6%) | 0.571 |
| | | | |
| **Number of all PROMS completed** | 83 (90.2%) | 81 (83.5%) | 0.173 |

**Table S5 (continued) - Missing data stratified by individual items and PROMs. All data are n (%).**

PROM – Patient Reported Outcome Measure

EQ-5D-5L – EuroQOL-5D-5L

HADS – Hospital Anxiety and Depression Scale

IES-R – Impact of Events Scale Revised