Perceived Discomfort in Patients admitted to Intensive Care (DETECT DISCOMFORT 1): a prospective observational study

Theresa Jacques, Anil Ramnani, Kush Deshpande and Pierre Kalfon

ABSTRACT

Background: Discomfort experienced by patients admitted to intensive care units (ICUs) is an important indicator of the quality of care provided, but few studies have evaluated the incidence and magnitude of discomfort in critically ill patients. The IPREA (Inconforts des Patients de REAnimation) discomfort questionnaire is a tool developed by French intensivists and validated in the French language with good internal consistency (Cronbach's α, 0.78).

Objectives: To translate and validate in English the IPREA discomfort questionnaire, to evaluate discomfort perceived by patients in intensive care, and to identify predictors of discomfort.

Design, setting and participants: After translating the IPREA questionnaire using published methods that use principles of good practice for translating and culturally adapting patient-reported outcomes measures, all eligible patients (aged > 18 years, Glasgow Coma Scale score of 15, English speaking) admitted to our ICU over the 6-month period from April 2017 to September 2017 were surveyed within 24 hours of ICU discharge. Patient-perceived discomfort was measured using the translated IPREA questionnaire. The patients were asked to score their discomfort for each of 16 items on a scale of 0 (no discomfort) to 100 (maximum discomfort). An overall discomfort score was computed as the mean score of the 16 individual discomfort scores. Multivariate analysis was performed to identify predictors of discomfort.

Main outcome measures: Translated questionnaire internal consistency. Individual and overall discomfort scores.

Results: A total of 168 patients (58% men; mean age, 60.1 ± 14.8 years; mean APACHE [Acute Physiology and Chronic Health Evaluation] II score, 13.8 ± 5.6) completed the questionnaire. The translated questionnaire had good internal consistency (Cronbach's α, 0.82), and good content and construct validity (average inter-item correlation, 0.23). The mean overall discomfort score was 18.4 ± 12.5, and discomfort scores did not differ between men and women or between types of ICUs (general ICU, cardiothoracic ICU or high dependency unit). On multivariate analysis, increasing age was an independent predictor of a low discomfort score (β, –0.27; 95% CI, –0.42 to –0.12; P = 0.001).

Conclusion: Patients admitted to our ICU reported low overall discomfort. There was an inverse relationship between age and perceived discomfort. The translated questionnaire for measuring discomfort performed well in our setting and could be applied to the Australian population.

Crit Care Resusc 2019; 21 (2):103-109

The factors that enhance the overall comfort or cause discomfort during a patient's intensive care unit (ICU) stay are not well studied, particularly from the patient's perspective. It is known that mitigating pain alone during mechanical ventilation does not make the experience free from discomfort.[1] Rather, discomfort is a multifactorial experience reflecting physical symptoms, psychological symptoms and environmental factors.[2] It is also an important indicator of ICU quality of care. Discomforts experienced in the ICU, if recalled in the recovery phase of a critical illness, may cause anxiety and sleep deprivation, induce post-traumatic stress disorder, and alter the quality of life for ICU survivors.[3] Being able to quantify and qualify discomfort will assist in modifying current practices to enhance patient comfort. Therefore, it is important that patient-centred outcome measures after a critical illness include reflection on the discomforts experienced in the ICU. The IPREA (Inconforts des Patients de REAnimation) discomfort questionnaire is a survey, written in the French language, that asks ICU survivors to grade their recall of a broad range of issues that may have caused them discomfort during their ICU stay.[4] Our objectives were to translate the IPREA questionnaire using published methods that use principles of good practice for translating and culturally adapting patient-reported outcomes (PRO) measures and apply this multifaceted French tool in our Australian ICU setting, to identify and quantify the most important discomfort sources reported by critically ill patients using IPREA, and to identify predictors of overall discomfort perceived by ICU survivors.[5]

Methods

Permission was obtained to adapt the IPREA questionnaire from its designers.[4] We used a pragmatic adaptation of the guidelines from the International Society of Pharmacoeconomics and

Table 1. French version of the IPREA (Inconforts des Patients de REAnimation) discomfort questionnaire and its English translation

French version	English translation
1. Avez-vous souffert du bruit (alarmes, radios, sonneries de téléphone, conversations) de jour comme denuit?	1. Have you experienced discomfort from noise (alarms, radios, telephones, conversations) during the day and/or night?
2. Avez-vous souffert de la lumière (éclairage trop important dans la chambre ou dans le couloir surtout la nuit?	2. Have you suffered from too much light in your ICU room or in the hallway, especially at night?
3. Avez-vous souffert du lit (matelas trop dur ou trop mou, matelas à eau, tête de lit trop ou pas assez relevée, lit trop bas ou trop haut, barrières, mauvais oreillers, etc)?	3. Have you felt uncomfortable in your bed? (that is, is the mattress too hard or too soft, head of bed too high or not high enough, sides of bed too high or too low, uncomfortable pillows?)
4. Avez-vous souffert du manque de sommeil par rapport à d'habitude?	4. Have you suffered from lack of sleep compared with your usual sleep pattern?
5. Avez-vous souffert de la soif?	5. Have you felt uncomfortable due to thirst?
6. Avez-vous souffert de la faim?	6. Have you felt uncomfortable due to hunger?
7. Avez-vous souffert du froid?	7. Have you suffered from the cold?
8. Avez-vous souffert de la chaleur?	8. Have you suffered from the heat?
9. Avez-vous eu des douleurs, même si elles étaient présentes avant l'hospitalisation, y compris les douleurs liées aux piqûres ou lors des changes ou de la toilette matinale?	9. Have you had more pain than usual for you, for example from needles, catheters, tubes, being turned or washed?
10. Avez-vous souffert d'être entouré de tuyaux (pour les perfusions, les connections des électrodes fixées sur le thorax, l'oxygène dans le nez ou surle masque, la pince pour surveiller l'oxygénation, etc)?	10. Have you had discomfort from tubes/connections to machines (such as from IV lines, electrode connections, tubes in your throat, or oxygen mask)?
11. Avez-vous été gêné par le fait que votre intimité ne soit pas suffisamment respectée (par ex. pendant la toilette matinale, les changes, l'examen par les médecins, ou les visites médicales)?	11. Have you felt embarrassed or did you feel your privacy was not respected? (for example during the morning wash, changes, review by the doctors or the medical visits)
12. Avez-vous souffert d'angoisse (peur parfois panique par exemple qu'un appareil important fonctionne mal, provoquée parfois par le déclenchement d'alarmes sonores) ou vous êtes vous senti très anxieux durant votre hospitalisation?	12. Have you suffered from anxiety or panic (for example being scared that an important piece of medical equipment may malfunction or disconnect?)
13. Avez-vous souffert d'isolement (être seul dans votre chambre, parfois sans voir d'infirmiers ou de médecins à proximité) et sans entendre debruit?	13. Have you felt isolated (being alone in your room, sometimes not seeing nurses or doctors nearby) and not hearing any sounds?
14. Avez-vous été gêné par la limitation des visites des membres de votre famille ou de vos amis selon les horaires de visite en vigueur dans le service?	14. Did the ICU visiting hours (that is restricting when your family and or friends could visit you) bother you?
15. Avez-vous été gêné de ne pas avoir de téléphone dans la chambre?	15. Have you been bothered by not having a telephone in the room?
16. Avez-vous été gêné de n'être pas assez informé de votre état ou de ce qu'on allait vous faire, de l'évolution de votre maladie, de votre date de sortie de réanimation, des suites, que ce soit par les infirmières ou les médecins?	16. Did you feel you were not informed enough about such things as your condition, treatment plan, progress or when you would leave ICU?

ICU = intensive care unit. IV = intravenous.

Outcomes Research Task Force for Translation and Cultural Adaptation.[5] Two of us (TJ, AR) worked on the translation with a French native, English-speaking, linguistics expert, a lay native French speaker (expert) with fluency in English (the target language), and a native English speaker with fluency in French (the source language).

The translation process followed recommended methods for translating and culturally adapting PRO measures[5] which

have previously been used for translating the Richards–Campbell Sleep Questionnaire into German.[6] It involved:

- forward translating from the source language (French) to the target language (English) — completed by both language experts;
- reconciling translations into one version – completed by the language experts and all four of us (TJ, AR, KD, PK);
- testing on a lay person for whom English is a first language and who is fluent in French;
- back translating using translation software;
- reviewing the back-translated version — completed by the translators;
- proofreading — completed by one of us (TJ);
- testing the translated and proofread version on two social workers within the St George Hospital ICU department, (both were native English speakers and were extremely familiar with common colloquial phrases used by patients in their regular, day-to-day interactions with them); and
- pilot testing the questionnaire on 20 ICU survivors (the target population).

For the pilot testing, one of us (AR) personally administered the 20 surveys, and observed that participants found the question-and-response format to be clear and that participants could complete the questionnaire in a short time frame without hesitation. Three of us (TJ, AR, KD) then proceeded with using the English version without further modifications to the questions (Table 1). A free-text section at the end of the survey, asking for ideas for improving comfort, was included in our English version. (online Appendix, available at cicm.org.au/Resources/Publications/Journal)

Table 2. Demographic characteristics of patients included in the study

Characteristic	Number (%), unless otherwise stated
Mean age in years ± SD (*n* = 168)	60.5 ± 14.3
Sex (*n* = 168)	
Female	71 (42.3%)
Male	97 (57.7%)
Marital status (*n* = 166)	
Never married	26 (15.7%)
Married	111 (66.9%)
Separated/divorced/widowed	29 (17.4%)
Employment status (*n* = 168)	
Not employed	86 (51.2%)
Not specified	64 (38.1%)
Employed	18 (10.7%)
Type of intensive care unit (*n* = 168)	
General intensive care unit	49 (29.2%)
Cardiothoracic intensive care unit	53 (31.5%)
High dependency unit	66 (39.3%)
Single room (*n* = 158)	
Yes	13 (8.2%)
No	145 (91.8%)
Mean APACHE II score ± SD (*n* = 168)	13.8 ± 5.6
Median length of stay in days (IQR) (*n* = 168)	4.5 (1.4–28.6)

APACHE = Acute Physiology and Chronic Health Evaluation. IQR = interquartile range. SD = standard deviation.

The study was conducted in a tertiary ICU (with a casemix of medical patients, and surgical patients including major trauma and cardiothoracic patients) over a 6-month period from April 2017 to September 2017. The ICU had a mixture of patients requiring a 1:1 or 1:2 nurse–patient ratio. All English-speaking patients older than 18 years with an ICU length of stay of 48 hours or more, and a Glasgow coma scale score of 15 at the time of discharge were included in the study. The patients who, in the opinion of the treating clinician, had an episode of delirium during their ICU stay were excluded. Patients were asked to complete the questionnaire within 24 hours of ICU discharge having read the study explanation which included consent and ability to opt out at any time. Completion of the questionnaire involved recalling discomfort experienced during the entire stay in the ICU across 16 items on a visual analogue scale of 0 (no discomfort) to 100 (maximum discomfort) for each item. The overall discomfort score was computed as the mean of the 16 items scored. In addition, the following patient data were collected: demographics (age, sex, marital status, religion, and occupational status), APACHE (Acute Physiology and Chronic Health Evaluation) II scores, diagnosis at the time of admission, and length of ICU stay. The study was approved by the regional research ethics committee.

Statistical analysis

The continuous variables were expressed as mean ± standard deviation or median and interquartile range (IQR) as appropriate, and categorical variables were expressed as numbers and percentages. Internal consistency was measured using Cronbach's α, and content and construct validity was measured by average inter-item correlation. The floor-and-ceiling effect was also determined for each item. A performance–importance plot was constructed to assess

Table 3. Analysis of individual item characteristics

Item	Mean score ± SD	Median score (IQR)	Range of scores	Floor effect, %*	Ceiling effect, %†	Average inter-item correlation	Cronbach's α
1. Noise	27.6 ± 26.3	20 (5–50)	0–100	23.8	0.6	0.2309	0.8183
2. Excessive light	20.9 ± 24.1	10 (0–40)	0–100	34.5	0.6	0.2232	0.8117
3. Bed-related discomfort	21.5 ± 26.3	10 (0–40)	0–100	40.5	0.6	0.2191	0.8080
4. Sleep deprivation	38.5 ± 32.8	40 (7.5–70)	0–100	23.2	4.2	0.2184	0.8740
5. Thirst	24.3 ± 30.3	10 (0–45)	0–100	42.9	3.0	0.2293	0.8169
6. Hunger	13.8 ± 22.9	0 (0–20)	0–90	58.9	0	0.2316	0.8189
7. Feeling of cold	14.1 ± 23.0	0 (0–20)	0–100	54.8	1.2	0.2304	0.8179
8. Feeling of heat	14.6 ± 23.2	0 (0–20)	0–100	56.0	1.2	0.2234	0.8119
9. Pain	31.4 ± 32.8	20 (0–50)	0–100	32.1	3.6	0.2182	0.8072
10. Perfusion lines etc	32.0 ± 29.2	22.5 (7.5–50)	0–100	22.6	4.2	0.2217	0.8103
11. Lack of privacy	8.6 ± 17.4	0 (0–10)	0–80	68.5	0	0.2218	0.8104
12. Anxiety	18.3 ± 25.2	5 (0–30)	0–90	48.8	0	0.2251	0.8168
13. Isolation	3.0 ± 3.7	1 (1–2.5)	1–16	66.7	0	0.2260	0.8141
14. Limited visiting hours	8.5 ± 18.9	0 (0–10)	0–90	69.6	0	0.2264	0.8144
15. Absence of phone	5.7 ± 15.9	0 (0–0)	0–90	78.6	0	0.2407	0.8263
16. Lack of information	11.5 ± 18.6	0 (0–20)	0–80	58.9	0	0.2318	0.8190
Overall discomfort score	18.4 ± 12.5	16.9 (8.8–25.8)	0.1–57.7	—	—	0.2264	0.8240

IQR = interquartile range. SD = standard deviation. * Floor effect is the percentage of respondents at the lowest possible score on the scale (ie, 0). † Ceiling effect is the percentage of respondents at the highest possible score on the scale (ie, 100).

the correlation between each item and the total discomfort score. Multivariate analysis was performed to identify predictors of discomfort. A multiple linear regression model was fitted with total discomfort score as the dependent variable and age, sex, marital status, APACHE II score, length of ICU stay and type of ICU as independent variables. A stepwise backward elimination process was used to determine the variables predicting the total discomfort score. A *P* value of less than 0.05 was considered statistically significant. Stata version 14.2 (StataCorp, College Station, Tex, USA) was used for all statistical analyses.

Results

Of 172 eligible intensive care patients discharged from the ICU, 168 participated in the study. Their demographic characteristics are shown in Table 2. The mean age of participants was 60.1 years, 58% of participants were men, and the mean APACHE II score was 13.8. The translated questionnaire had good internal consistency (Cronbach's α, 0.82), and good content and construct validity (average inter-item correlation, 0.23). The mean overall discomfort score was 18.4 ± 12.5 and did not differ by sex or type of ICU (general ICU, cardiothoracic ICU, or high dependency unit).

The scores for each of the 16 items and the overall discomfort score are shown in Table 3. The highest median scores were for sleep deprivation (median 40; IQR, 7.5–70), lines and tubes (median 22.5; IQR, 7.5–50), noise (median 20; IQR, 5–50) and pain (median 20; IQR, 0–50).

The floor effect is the percentage of respondents scoring the item as zero or the minimum value. The items most frequently scored at minimum were absence of phone, isolation, and lack of privacy. The items most frequently perceived as causing discomfort were environmental noise (76.2%), sleep deprivation (76.8%), and lines and tubes (77.4%). The ceiling effect is the percentage of respondents scoring the item at 100 or the maximum value. The items most frequently scored at maximum were sleep deprivation (4.2%), lines and tubes (4.2%), pain (3.6%) and thirst (3.0%).

The performance–importance plot for overall discomfort is shown in Figure 1. Items frequently mentioned as causes of discomfort and having high correlation with overall discomfort (upper left quadrant) can be identified as deserving more urgent improvement, as previously

Table 4. Results of the multivariate analysis

Variable	βCoefficient	95% CI	*P*
Age	–0.27	–0.42 to –0.10	0.001
Length of intensive care unit stay	0.07	–0.26 to 0.41	0.66
Male sex	1.43	–2.38 to 5.25	0.46
APACHE II	–0.12	–0.50 to 0.25	0.51
Marital status			
Married	–0.005	–5.45 to 5.44	0.94
Separated/divorced/ widowed	3.67	–3.27 to 10.62	0.30
Not married*	—	—	—
Type of intensive care unit			
Cardiothoracic intensive care unit	–1.70	–6.68 to 3.28	0.50
High dependency unit	–2.38	–7.14 to 2.39	0.33
General intensive care unit*	—	—	—

APACHE = Acute Physiology and Chronic Health Evaluation. * Reference category.

described.[7] These items were sleep deprivation, pain, perfusion lines, bed-related discomfort, excessive light, and thirst.

On multivariate analysis, increasing age was found to be an independent predictor of low discomfort score (β, –0.26; 95% CI, –0.42 to –0.11; $P = 0.001$) after adjusting for sex, marital status, APACHE II score and type of ICU. For each decade increase in age, the discomfort score decreased by 2.6 points (Table 4, Figure 2).

Discussion

Our principal findings are that the French language IPREA questionnaire has translated well to English, mean total discomfort score was low for our patients, and increasing age was associated with less discomfort.

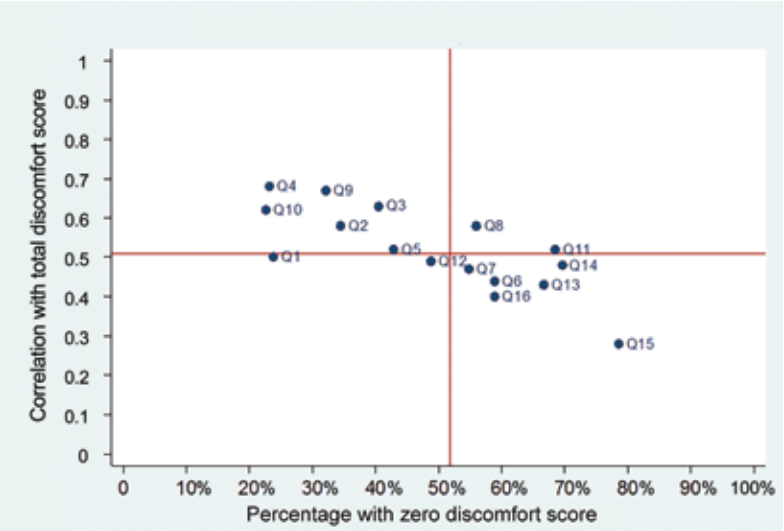
Some items in the questionnaire have been measured individually in ICU populations even as part of routine ICU care. Measurement of pain by a visual analogue scale for conscious patients or a behavioural rating scale for patients who cannot communicate their pain is common in ICUs.[8] Sleep deprivation measurement using instruments such as the Richards–Campbell Sleep Questionnaire[9,10] has been studied in ICU patients. The IPREA questionnaire is unique in that it combines these commonly measured parameters with other factors such as hunger, thirst, feeling isolated, feeling a lack of privacy, feeling anxious and loss of dignity, as well as environmental causes of discomfort such as ambient noise, temperature and ICU interventions (eg, nasogastric, intravenous and intercostal tubes) in an all-encompassing concept of patient discomfort.

Kalfon and colleagues piloted the 16-item IPREA questionnaire in a single French ICU and then tested it in 14 other French ICUs.[4] One of the researchers who contributed to this study was an epidemiologist skilled in the development of health-related quality-of-life outcome measurement instruments.[11] The group avoided using disease-specific items and discomfort caused by either specific ICU procedures or vague items that could be interpreted in different ways. This ensured that the questionnaire was applicable to a global ICU population independent of the reason for ICU admission. This has the advantage that the instrument can be used across all ICU survivors irrespective of disease process. It focuses on the individual patient ICU experience and recollection of that experience. It gives us the opportunity to modify that experience to improve patient comfort.

Using published good-practice methods to translate the IPREA questionnaire meant that we maintained sense and idiom, important in ensuring the overall concept of discomfort and its multiple causes. The IPREA questionnaire performed well after being translated into English, with internal consistency maintained. Kalfon et al[4] had accepted a Cronbach's α of at least 0.7. Our translated items achieved at least 0.8. That is, all 16 items that make up the overall discomfort score continue to relate to the discomfort construct in English. Individual questionnaire items had an inter-item correlation of 0.23. Average inter-item correlations in the range of 0.15 to 0.50 are considered as indicating an acceptable level of consistency, with < 0.15 for an item indicating that it is unrelated and > 0.50 meaning that the item is likely to be redundant due to too much overlap with another item. So, just as Kalfon et al[4] demonstrated that each of the 16 items relates to the overall concept of discomfort and none of the items are redundant, the 16-item English translation remains robust. We therefore believe that the English version of this questionnaire can now be used broadly in Australian ICUs.

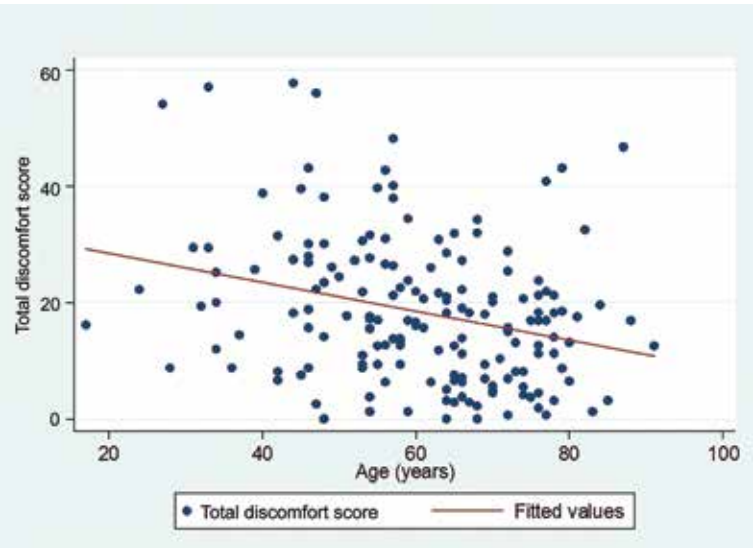
Our result of a mean overall discomfort score of 18.4 ± 12.5 is comparable with the results of the initial study by Kalfon et al.[4] They reported a mean discomfort

Figure 1. Performance–importance plot for overall discomfort*



* Vertical and horizontal bars indicate the median distributions.

Figure 2. Scatter plot of total discomfort score versus age



score of 22 ± 14. We did not demonstrate the sex difference found by Kalfon et al.[4] They had found that women had a significantly higher level of overall discomfort. However, our sample was much smaller and our study was conducted in a single centre. There was a slightly different individual item spectrum in our data. Our four highest scores were for sleep deprivation (38.5 ± 32.8), being tied down by lines (32.0 ± 29.2), pain (31.4 ± 32.8) and noise (27.6 ± 26.3), compared with Kalfon and colleagues' results of sleep deprivation (35 ± 33), being tied down by lines (33 ± 30), pain (32 ± 30) and thirst (32 ± 34).[4] Our most frequently mentioned items were noise, sleep deprivation and being tied down by lines. Our ICU was an open-plan ICU with little space between beds, so noise rating as one of the top items and feeling of isolation having the lowest score (3.0 ± 3.7) reflect this ICU environment. This demonstrates the potential for interventional studies to address the items that cause the most concern in a particular ICU setting. To that end, Kalfon et al have conducted an interventional study across several French ICUs to measure improvement in patient comfort with unit-specific interventions to address the main causes of discomfort for that particular ICU.[12]

We included a free-text section at the end of the questionnaire, which was not included in the original IPREA questionnaire. One insight gained from this was the finding that a main cause of nocturnal noise was metallic bin closure — a major source of noise-related discomfort that was readily rectifiable. Another insight from the free-text responses was related to cultural needs not being addressed in our routine model of care — a major source of anxiety. This information was fed back to ICU staff at the completion of the study.

There are limitations to our study. We did not undertake test–retest reliability as reported by Kalfon et al[4] in the original testing of the questionnaire. This is being addressed in our current study of the impact of a purpose-built ICU on patient comfort. Also, demographic data were drawn from the hospital database, so some information that is collected at the time of admission (eg, employment status) was often missing, necessitating the removal of some variables from the multivariate analysis. While we had a very high response rate (98%) we did not collect any data on ICU interventions, sedation used or episodes of delirium during ICU stay, and we did not test recall of ICU events. We adopted a pragmatic approach whereby patients in whom delirium had been diagnosed by the treating ICU physician were excluded as it may affect ability to recall the ICU experience and those patients may have an altered perception of reality. Other researchers have previously demonstrated a negative association between delirium and factual recall.[13] Only patients with

a Glasgow coma scale score of 15 within 24 hours after ICU discharge were included. Our focus was on recalled discomfort after ICU discharge as the patient experience rather than discomfort observed by a third person. Not all discomfort aspects will be recalled during recovery from a critical illness, but it is those that are remembered that are likely to affect the recovery phase.[14,15]

Our analysis revealed a negative association of age with discomfort. This may partly be explained by a diminished ability to recall facts relating to discomfort with increasing age. Reduction in ability to recall the facts from an ICU experience with increasing age has previously been described.[16] Future research measuring multifaceted discomfort could investigate the long term sequelae of discomforts experienced in the ICU and the effects of minimising discomforts on these sequelae.

Conclusion

The translated French discomfort questionnaire performed well in our ICU setting. The IPREA questionnaire has the potential to be applied more broadly to Australian ICUs in clinical and research settings. Overall recalled discomfort was low in our ICU patients and there was an inverse relationship between age and discomfort.

Ethics approval: This study was approved by the South Eastern Sydney Local Health District Human Research Ethics Committee.

Acknowledgements: We thank Patricia Marechal-Ross, Sorbonne Nouvelle, Bella Marechal-Ross and Nathalie Azad for translation and idiom advice, Dallas Nolan and Belinda Hocking for pilot testing, and Julie Beeson and Sophie Roome for data collection.

Competing interests

None declared.

Author details

Theresa Jacques[1,2]
Anil Ramnani[3]
Kush Deshpande[1,2]
Pierre Kalfon[4,5]

1 St George Hospital, Sydney, NSW, Australia.
2 University of New South Wales, Sydney, NSW, Australia.
3 Canberra Hospital, Canberra, ACT, Australia.
4 Hôpitaux de Chartres, Chartres, France.
5 Centre d'Études et de Recherche sur les Services de Santé et la Qualité de Vie CEReSS, Aix-Marseille University, Marseille, France.

***Correspondence*:** T.Jacques@unsw.edu.au

References

1 Berntzen H, Bjork IT, Woien H. "Pain relieved, but still struggling"—critically ill patients experiences of pain and other discomforts during analgosedation. *J Clin Nurs* 2018; 27: e223-e34.

2 Nelson JE, Meier DE, Oei EJ, et al. Self-reported symptom experience of critically ill cancer patients receiving intensive care. *Crit Care Med* 2001; 29: 277-82.

3 Kalfon P, Alessandrini M, Boucekine M, et al. Tailored multicomponent program for discomfort reduction in critically ill patients may decrease post-traumatic stress disorder in general ICU survivors at 1 year. *Intensive Care Med* 2019; 45: 223-35.

4 Kalfon P, Mimoz O, Auquier P, et al. Development and validation of a questionnaire for quantitative assessment of perceived discomforts in critically ill patients. *Intensive Care Med* 2010; 36: 1751-8.

5 Wild D, Grove A, Martin M, et al. Principles of good practice for the translation and cultural adaptation process for patient-reported outcomes (PRO) measures: report of the ISPOR Task Force for Translation and Cultural Adaptation. *Value Health* 2005; 8: 94-104.

6 Krotsetis S, Richards KC, Behncke A, Kopke S. The reliability of the German version of the Richards Campbell Sleep Questionnaire. *Nurs Crit Care* 2017; 22: 247-52.

7 Dodek PM, Heyland DK, Rocker GM, Cook DJ. Translating family satisfaction data into quality improvement. *Crit Care Med* 2004; 32: 1922-7.

8 Li D, Puntillo K, Miaskowski C. A review of objective pain measures for use with critical care adult patients unable to self-report. *J Pain* 2008; 9: 2-10.

9 Richards KC, O'Sullivan PS, Phillips RL. Measurement of sleep in critically ill patients. *J Nurs Meas* 2000; 8: 131-44.

10 Freedman NS, Kotzer N, Schwab RJ. Patient perception of sleep quality and etiology of sleep disruption in the intensive care unit. *Am J Respir Crit Care Med* 1999; 159: 1155-62.

11 Auquier P, Pernoud N, Bruder N, et al. Development and validation of a perioperative satisfaction questionnaire. *Anesthesiology* 2005; 102: 1116-23.

12 Kalfon P, Baumstarck K, Estagnasie P, et al. A tailored multicomponent program to reduce discomfort in critically ill patients: a cluster-randomized controlled trial. *Intensive Care Med* 2017; 43: 1829-40.

13 Roberts BL, Rickard CM, Rajbhandari D, Reynolds P. Factual memories of ICU: recall at two years post-discharge and comparison with delirium status during ICU admission – a multicentre cohort study. *J Clin Nurs* 2007; 16: 1669-77.

14 Jones C, Griffiths RD, Humphris G, Skirrow PM. Memory, delusions, and the development of acute posttraumatic stress disorder-related symptoms after intensive care. *Crit Care Med* 2001; 29: 573-80.

15 Granja C, Gomes E, Amaro A, et al. Understanding posttraumatic stress disorder-related symptoms after critical care: the early illness amnesia hypothesis. *Crit Care Med* 2008; 36: 2801-9.

16 van de Leur JP, van der Schans CP, Loef BG, et al. Discomfort and factual recollection in intensive care unit patients. *Crit Care* 2004; 8: R467-73.

Appendix

This appendix was part of the submitted manuscript and has been peer reviewed. It is posted as supplied by the authors.

Research Study- **"Perceived discomforts in ICU: Impact of new environment."**

This study is being conducted to assess the extent of discomfort faced by you during your ICU stay.

Managing your comfort during your Intensive Care Unit (ICU) stay is important to us. We would like to gain a more detailed insight on your experience in ICU particularly any discomfort experienced such as but not limited to pain, lack of sleep, and lack of privacy amongst other sources of discomfort. We are using a validated questionnaire for this purpose.

If you agree to participate please fill out the attached questionnaire and a research team member will collect it from you. You can also complete the *survey* within 24 hours of being discharged from ICU. If you are unable to complete the *survey* by yourself a research team member will assist you to complete the form. You may choose *not* to complete the survey.

The information you provide on the survey will only be seen by the study team and will be kept secure and confidential.

Your voluntary completion of the survey constitutes consent to participate. You may withdraw from the study at any time without giving a reason, it will have no effect on the remainder of your ICU or hospital care. You can withdraw by contacting the principle investigator Dr Anil P. Ramnani or RSO via the contact details on the survey cover page.

If you have any concerns or complaints about the conduct of this study you should contact the Research Support Office of the South Eastern Sydney Local Health District Human Research Ethics Committee which is nominated to receive complaints from research participants. You should contact them on 02 9382 3587 or *email* SESLHD-RSO@health.nsw.gov.au and quote the reference number 16/394(LNR/16/POWH/736).

Thank you for assisting us with this study.

Yours Sincerely

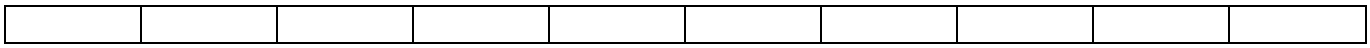
Anil P Ramnani
Post Graduate Fellow, ICU
St George Hospital
[redacted]

Questionnaire: Discomforts perceived by ICU patients

Please place an X where you want to score on the scale in response to the question.

1. Have you experienced discomfort from ***noise*** (alarms, radios, telephones, conversations) during the and/or night?

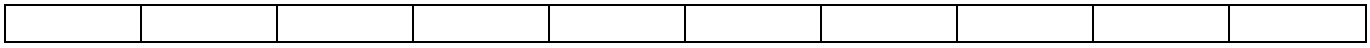
None Mild Moderate Severe



0 10 20 30 40 50 60 70 80 90 100

2. Have you suffered from ***too much light*** in your ICU room or in the hallway, especially at night?

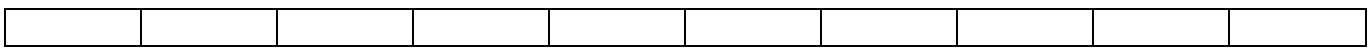
None Mild Moderate Severe



0 10 20 30 40 50 60 70 80 90 100

3. Have you felt uncomfortable in ***your bed?*** (that is, is the mattress too hard or too soft, head of bed too high or not high enough, sides of bed to high or low, uncomfortable pillows?)

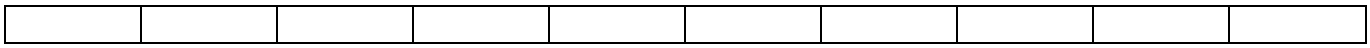
None Mild Moderate Severe



0 10 20 30 40 50 60 70 80 90 100

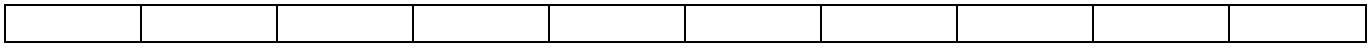
4. Have you suffered from ***lack of sleep*** compared to your usual sleep pattern?

None Mild Moderate Severe



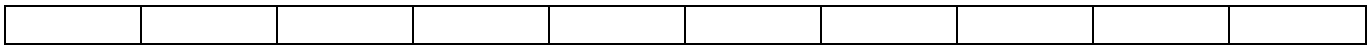
5. Have you felt uncomfortable due to ***thirst?***

None Mild Moderate Severe



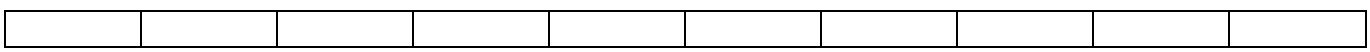
6. Have you felt uncomfortable due to ***hunger?***

None Mild Moderate Severe



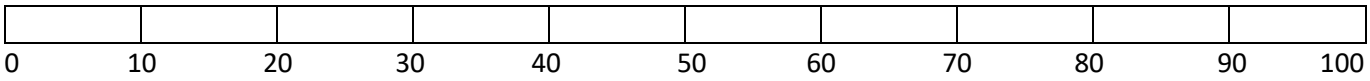
7. Have you suffered from the ***cold?***

None Mild Moderate Severe



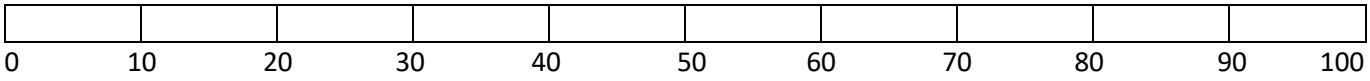
8. Have you suffered from the ***heat?***

None Mild Moderate Severe



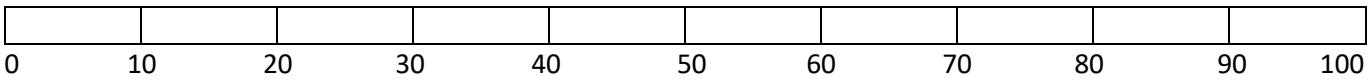
9. Have you had more ***pain than usual for you?*** For example from needles, catheters, tubes, being turned or washed?

None Mild Moderate Severe



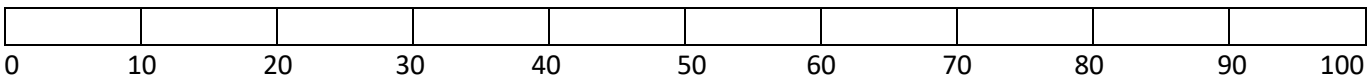
10. Have you had discomfort from ***tubes/connections to machines*** (such as from IV lines, electrode connections, tubes in your throat, or oxygen mask?)

None Mild Moderate Severe



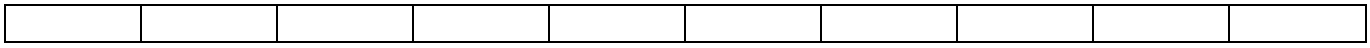
11. Have you felt ***embarrassed*** or did you feel your privacy was not respected? (For example during the morning wash, changes, and review by the doctors or the medical visits?)

None Mild Moderate Severe



12. Have you suffered from ***anxiety or panic*** (for example, being scared that an important piece of medical equipment may malfunction or disconnect?)

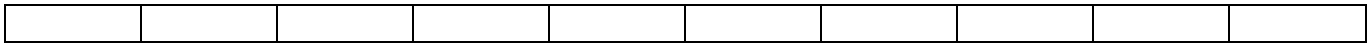
None Mild Moderate Severe



0 10 20 30 40 50 60 70 80 90 100

13. Have you felt ***isolated*** (being alone in your room, sometimes not seeing nurses or doctors nearby) and not hearing any sounds?

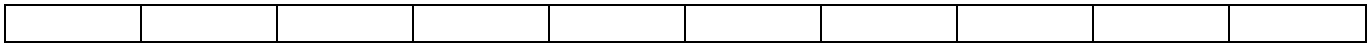
None Mild Moderate Severe



0 10 20 30 40 50 60 70 80 90 100

14. Did the ICU ***visiting hours*** (that is restricting when your family and/or friends could visit you) bother you?

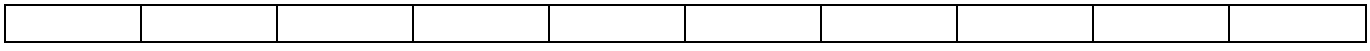
None Mild Moderate Severe



0 10 20 30 40 50 60 70 80 90 100

15. Have you been bothered by not having a ***telephone*** in the room?

None Mild Moderate Severe



0 10 20 30 40 50 60 70 80 90 100

16. Did you feel you were ***not informed enough*** about such things as your condition, treatment plan, progress or when you would leave ICU?

None		Mild			Moderate				Severe	
0	10	20	30	40	50	60	70	80	90	100

Do you have any other comments or suggestions on how we could improve your comfort in our ICU?

¬¬

¬¬

¬¬

¬¬

¬¬

¬¬

Thank you for your participation.