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Distribution-based estimates of minimal important difference for hospital anxiety and depression scale and impact of event scale-revised in survivors of acute respiratory failure

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ABSTRACT

Objective: This study will estimate distribution-based minimal important difference (MID) for the Hospital Anxiety and Depression Scale anxiety (HADS-A) and depression (HADS-D) subscales, and the Impact of Event Scale-Revised (IES-R) in survivors of acute respiratory failure (ARF).
Methods: Secondary analyses of data from two US and three UK studies of ARF survivors (total N=1223). HADS-D and HADS-A were used to assess depression and anxiety symptoms. IES-R assessed post-traumatic stress disorder symptoms. Standard error of measurement, minimal detectable change$_{90}$, 0.5 standard deviation (S.D.), and 0.2 S.D. were used to estimate MID for the combined sample, by studies, 6- and 12-month follow-ups, country and mental health condition.
Results: Overall, MID estimates converged to 2.0–2.5 for the HADS-A, 1.9–2.3 for the HADS-D and 0.17–0.18 for the IES-R. MID estimates were comparable across studies, follow-up, country and mental health condition.
Conclusion: Among ARF survivors, 2.0–2.5 is a reasonable range for the MID for both HADS subscales, and 0.2 is reasonable for IES-R. Until anchor-based MIDs for these instruments are available, these distribution-based estimates can help researchers plan future studies and interpret the clinical importance of findings in ARF patient populations.

1. Introduction

Psychological symptoms are common in patients surviving acute respiratory failure (ARF) requiring mechanical ventilation in an intensive care unit (ICU) [1–4]. A recent study of ARF survivors reported that >38% screened positive for general anxiety, >26% for depression, >22% for posttraumatic stress disorder (PTSD) during a 2-year longitudinal follow-up [5]. The Hospital Anxiety and Depression Scale (HADS) [6] and Impact of Event Scale-Revised (IES-R) [7] have been used in studies of ICU survivors [3,5,8–10] to assess symptoms of these conditions. While the HADS and IES-R demonstrate good reliability and validity in ICU survivors [2,11] and other populations [12–14], the minimal important difference (MID) has not been reported in ARF survivors.

MID estimates are useful for determining the clinical relevance of group differences or patient change and for sample size calculations for clinical trials. MIDs may be estimated using anchor-based or distribution-based approaches. Anchor-based approaches offer direct estimates of MIDs but require additional data from patient ratings of change or other instruments with an established MID to serve as the anchor. If calculating anchor-based MIDs is not feasible, distribution-based

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approaches, which evaluate score difference or change relative to sampling variability, can provide indirect estimates of MID using only data from the target instrument. Cohen's thresholds for small and medium effect sizes, which assist in interpreting the magnitude of group differences [15], can also inform the determination of an MID [16]. Using a large sample of ARF survivors from five studies conducted in the United States and United Kingdom, we estimate distribution-based MIDs for the HADS anxiety (HADS-A) and depression (HADS-D) subscales and the IES-R.

2. Methods

2.1. Data sources

Secondary analyses were performed using data from five studies. ARDSNet Long-Term Outcomes Study (ALTOS) is a multicenter national prospective study of ARF survivors recruited from 41 hospitals in the US, with 6- and 12-month follow-up between 2008 and 2012 [17]. Improving Care of Acute Lung Injury Patients (ICAP) is a prospective cohort study evaluating ARF survivors from four teaching hospitals in Baltimore, MD, with 6- and 12-month follow-ups between 2005 and 2008 [5]. Conventional ventilator support versus Extracorporeal membrane oxygenation for Severe Adult Respiratory failure (CESAR) is a multicenter randomized trial of extracorporeal membrane oxygenation versus conventional ventilatory support in ARF, with 6-month follow-up between 2002 and 2007 [18]. Pragmatic Randomized, Controlled Trial of Intensive Care follow up programs in improving Longer-term outcomes from critical illness (PRaCTICaL) is a multicenter randomized trial of a nurse-led intensive care follow-up program versus standard care in ARF patients with 6- and 12-month follow-ups between 2007 and 2008 [19]. The study by Jones et al. [4] is a multicentered randomized trial of a rehabilitation program in ARF survivors. Both intervention and control group participants from these trials were included.

2.2. Measures

The HADS-D and HADS-A subscales [6] range from 0 to 21 based on seven items, with scores ≥8 indicating at least mild anxiety or depression symptoms, respectively. The IES-R[7] has 22 items and ranges from

Table 1
Participant characteristics by study

		US studies		UK studies		
Variables	Pooled (*N*=1223)	ALTOS (*N*=629)	ICAP (*N*=186)	PRaCTICaL (*N*=232)	Jones (*N*=102)	CESAR (*N*=74)
Age years mean (S.D.)	51 (15)	49 (14)	49 (14)	58 (16)	53 (16)	44 (12)
Male *n* (%)	646 (53)	306 (49)	105 (57)	133 (58)	59 (58)	43 (58)
Race *n* (%)						
White	603 (74)	496 (79)	107 (58)	NA	NA	NA
Black	175 (22)	100 (16)	75 (41)	NA	NA	NA
Other	36 (4)	33 (5)	3 (2)	NA	NA	NA
APACHE II score mean (S.D.)	23 (8)	26 (8)[†]	24 (8)	19 (7)	16 (5)	19 (6)
Ventilation duration, mean mean (S.D.)	11 (11)	11 (10)	14 (15)	7 (8)	NR	NR
ICU length of stay, mean mean (S.D.)	15 (15)	14 (11)	19 (17)	7 (9)	19 (20)	34 (27)
Hospital length of stay mean (S.D.)	29 (27)	22 (16)	32 (23)	29 (24)	47 (41)	64 (49)
Mental health, overall sample[‡]						
6-month HADS-A mean (S.D.)	6.7 (4.8)	7.1 (4.9)	5.7 (4.8)	6.5 (4.6)	7.1 (4.7)	6.5 (4.5)
6-month Anxiety[1] *n* (%)	469 (40)	260 (42)	52 (32)	86 (39)	46 (45)	25 (34)
6-month HADS-D mean (S.D.)	5.7 (4.5)	6.1 (4.8)	5.2 (4.2)	5.3 (4.1)	5.6 (3.9)	4.9 (4.2)
6-month Depression[2] *n* (%)	370 (32)	222 (36)	41 (26)	60 (27)	31 (30)	16 (22)
6-month IES-R mean (S.D.)	1.0 (0.9)	1.0 (0.9)	0.9 (0.8)	NA	NA	NA
6-month PTSD[3] *n* (%)	179 (23)	148 (25)	31 (19)	NA	NA	NA
12-month HADS-A mean (S.D.)	6.7 (5.0)	7.0 (5.2)	6.4 (4.9)	6.0 (4.6)	NA	NA
12-month Anxiety[1] *n* (%)	359 (40)	241 (42)	50 (35)	68 (35)	NA	NA
12-month HADS-D mean (S.D.)	5.6 (4.7)	5.9 (4.9)	5.2 (4.1)	4.8 (4.3)	NA	NA
12-month Depression[2] *n* (%)	291 (32)	204 (36)	34 (24)	53 (28)	NA	NA
12-month IES-R mean (S.D.)	1.0 (0.9)	1.0 (0.9)	0.9 (0.9)	NA	NA	NA
12-month PTSD[3] *n* (%)	163 (23)	132 (23)	31 (22)	NA	NA	NA

NA = not available Higher scores on HADS-A, HADS-D, IES-R indicate poorer mental health.
[1] Based on HADS-A≥8.
[2] Based on HADS-D≥8.
[3] Based on IES-R≥1.6.
[†] Originally reported as APACHE III (mean=86, S.D.=26); presented as APACHE II using standard conversion (Reference: Schneider et al. J Crit Care. 2013 28(5):885.e1–8.)
[‡] Ns for Pooled, ALTOS, ICAP, PRaCTICaL, Jones, CESAR—HADS-A (6 m: 1170, 613, 161, 220, 102, 74; 12 m: 910, 575, 142, 193, NA, NA), HADS-D (6 m: 1170, 613, 161, 220, 102, 74; 12 m: 909, 574, 142, 193, NA, NA), and IES-R (6 m: 765, 621, 160, NA, NA, NA; 12 m: 714, 573, 141, NA, NA, NA).