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Intersectional Influences on Non-Engagement Among Critical Care Survivors: A Prospective Cohort Study

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Research Article

Keywords: Critical care recovery, service access and engagement, intersectionality

Posted Date: March 28th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-8927799/v1

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Additional Declarations: Competing interest reported. ZP has received honoraria for consultancy from GlaxoSmithKline, Lyric Pharmaceuticals, Faraday Pharmaceuticals and Fresenius-Kabi, educational support from Baxter and Nestle Health Science and speaker fees from Orion, Baxter, Sedana, Fresenius-Kabi and Nestle. RP undertakes paid consultancy work for Mode Sensors. SN, AJF, AA, TS, JS, JP and YW have no competing interests to declare.

Abstract

Background

Critical care survivors face long-term health and social care needs. Barriers to engagement with essential follow-up services contribute to worse outcomes. Understanding these barriers is crucial for equitable healthcare provision and service design.

Methods

We conducted a prospective cohort study of adult patients admitted to a critical care unit, between April 2023 and December 2024. Eligible patients with valid contact details were sent a questionnaire electronically, designed to identify needs, 72 hours post critical care discharge. The primary outcome was service engagement, defined as completion of the electronic questionnaire. Demographic and clinical data were obtained from the local audit team. Primary exposures were index of multiple deprivation (IMD) and ethnicity. Associations were determined with multivariable logistic regression (adjusted odds ratios, aOR) and intersectional analysis.

Results

Of 3058 patients discharged, 2191 (72%) were eligible for analysis. The majority (1558/2191,71%) did not engage with the follow-up service. Higher non-engagement was observed in patients from more deprived areas (IMD Quintiles 1[aOR = 1.39, CI = 1.03–1.88] and 2 [aOR = 1.46, CI = 1.08–1.98]) and of Black ethnic background (aOR = 1.69, CI = 1.25–2.28). Intersectional analysis revealed further at-risk populations (915/2191, 42%), including a large group of White individuals in areas of high deprivation and a small group of Black individuals in the least deprived areas.

Conclusions

Intersectional analysis identified groups at-risk of non-engagement overlooked by single-factor approaches. Considering both population size and relative risk is vital for designing critical care follow-up support services to maximise impact, allocate resources efficiently, and reduce existing disparities in recovery outcomes for critical care survivors.

Introduction

Over 200,000 people are admitted to intensive care units (ICU) in the United Kingdom annually (1). Seventy percent survive to discharge, but over half experience hospital readmission within a year and many develop new chronic conditions (2–9). Alongside physical recovery, psychological and cognitive challenges can occur, collectively termed Post Intensive Care Syndrome (PICS) and can lead to long-term

reliance on health and social care services (4, 10–12). National guidelines recommend follow-up care to address these complex needs (13, 14). Despite this, follow-up service engagement is variable (15, 16). Failure to address patient engagement contributes to persistent health inequalities, poorer health outcomes, and increased demand on health and social care services (17).

Healthcare policies and quality improvement initiatives increasingly recognise a patient's ability to engage as a critical factor influencing healthcare utilisation and outcomes (18, 19). Policy makers have highlighted the importance of supporting patient engagement to improve service uptake and adherence and to reduce the impact of social determinants of health (18–21). Patient engagement relies on the coordinated partnerships between patients and healthcare providers, but is not shaped by a single factor (22). Rather there is a dynamic interplay of multiple social identities and structural constructs - a concept known as intersectionality (23, 24). Ethnicity and socioeconomic status have emerged as important factors influencing patient engagement, with ethnic minority (term used for consistency with existing literature, though "global majority" is acknowledged as more accurate and inclusive) and socioeconomically deprived groups often facing greater barriers to engagement, higher admission rates and worse health outcomes (25–30). Conventional determinants of causal and associative factors may be too simplistic, as intersectionality is a framework determined by the overlap of identity factors (such as race, gender, socioeconomic status and disability) with systems of power (such as racism, classism and ableism), interacting to shape experiences (23, 31, 32). Social determinants of health and service accessibility are deeply intertwined with these intersectional identities and are key drivers of health disparities and engagement barriers (25, 33, 34). Critical care follow-up services design traditionally assumes a uniform capacity to engage across survivor populations. This risks systematically excluding groups whose recovery trajectories and social systems differ substantially. While some studies have examined characteristics of patients who engage with follow-up services compared with those who do not, this literature remains limited and has largely focused on clinical factors such as illness severity, length of stay, or comorbidity (35, 36). Socio-demographic characteristics are less consistently examined, and are often treated as isolated variables rather than considered jointly. To date, no studies have explicitly explored patterns of engagement with critical care follow-up services through an intersectional lens, potentially obscuring groups at heightened risk of non-engagement.

Identifying factors of non-engagement therefore requires acknowledgement of these intersecting factors and careful consideration when selecting analysis methodologies. Doing so ensures we are investigating the complex intersecting nature of non-engagement, rather than simply revealing single factor relationships. We examined our population of critical care survivors for features of non-engagement. We hypothesised that there might be a complex interaction between an individual's socioeconomic status and ethnicity, and their ability and inclination to engage with a critical care follow up service. Accordingly we aimed to identify intersectionality in subgroups of patients who did not engage.

Methods

Study design

We performed a prospective cohort study of adult patients admitted to the Adult Critical Care Unit at the Royal London Hospital, UK, between April 2023 and December 2024. Research ethics approval was obtained from Yorkshire and The Humber - Leeds West Research Ethics Committee (reference number 23/YH/0146, 22.08.2023). This study is reported in line with the STROBE checklist for cohort studies and was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (37).

Setting

The Royal London Hospital is a large tertiary centre located in North-East London, which is one of the most ethnically diverse and socioeconomically deprived regions in England (38). The unit serves a mixed patient population, including trauma and neurocritical care patients. Patients can be discharged to locations across London and neighbouring regions, either being discharged directly home or via their local hospital, a rehabilitation unit, a specialist hospital or indeed discharged to supported living facilities. Data collection occurred continuously between April 2023 and December 2024.

Participants - Eligibility criteria and selection

Patients aged ≥16 years who survived to hospital discharge and for whom complete data sets were available were included in the analysis (see section below *Excluded Datasets* for more detail).

Patients were sent an electronic questionnaire via text message and/or email, 72 hours post-discharge from critical care, with two reminder messages sent in the following 48 hours and a further invitation at 4 weeks post discharge from critical care. It was available in two additional languages (Polish and Bengali) selected to reflect the local population. A care navigator (a healthcare professional involved in the recovery pathway for critical care survivors) reviewed the questionnaires and referred to appropriate services.

Questionnaire

The electronic questionnaire consisted of four existing quality-of-life patient-reported outcome measures, chosen to reflect the breadth of symptoms experienced after critical illness: the EuroQol Five Dimensions (EQ5D), a widely used generic health-related quality of life instrument, demonstrating good validity in critically ill cohorts; the Post-ICU Presentation Screen - Community Version (PICUPS-Community), which in itself has limited psychometric data but is related to the PICUPS tool and is the only tool specifically designed for ICU population; the World Health Organisation Disability Assessment Schedule 2.0 (WHODAS 2.0), a disability measure shown to be reliable and valid in the ICU population; and the 36-Item Short Form Health Survey (SF-36), which has demonstrated good reliability and validity in this population (39–42). These four existing measures were included in entirety, back to back with no adaptations made by the study team.

Variables

Exposures

Data were collected as part of our Intensive Care National Audit and Research Centre (ICNARC) routine data collection. Demographic data included age on admission in whole years (owing to the small number of patients at either end of the age range, age was grouped into '≤17 years' and '≥ 90 years'), sex (at birth, as recorded in medical records), and ethnicity (grouped by Office of National Statistics census categories into Black, Asian, Mixed/Other, White and Not Stated). Socioeconomic status was determined from the recorded postcode, which was then linked to Office for National Statistics lower super output area to obtain the index of multiple deprivation (IMD). IMD was grouped into quintiles based on the IMD rank. Clinical data included: level of frailty (Clinical Frailty Scale (CFS) in conjunction with clinician based assessment informed by the subjective history documented in the medical notes – owing to the small number of patients classified as having a 'stable long term disability', affecting their independence with activity of daily living, this category was combined with the 'frail' category for analytical purposes), admitting speciality (categorised into medical, surgical (this was mainly emergency as elective surgical cases are treated in a different location post-operatively), neurosurgical and trauma), critical care length of stay (LOS), maximum organ support, APACHE II and the SOFA score. The primary exposures of interest were ethnicity and IMD.

Outcome measures

The primary outcome was engagement. Engagement was defined as completion of part or all of the questionnaire at any time. Completion of the questionnaire represents the minimum threshold for contact with the critical care follow-up pathway and therefore serves as a pragmatic indicator of service reach and accessibility rather than patient motivation alone. For the purpose of this study, 'non-engagement' refers to when a patient did not complete any of the questionnaire.

Data Sources and Measurement

All demographic and clinical data were obtained from routine ICNARC data collection and hospital records. IMD scores were derived from patient postcode linked to the Office for National Statistics lower super output areas.

Bias

We attempted to minimise bias by excluding individuals with incomplete key clinical or demographic variables to reduce misclassification (see below section *Excluded Datasets* and figure 1). Measurement bias was minimised by using routinely collected ICNARC data, which are subject to standardised definitions and audit processes.

Study Size

This was a cohort defined by all eligible admissions during the study period; no formal sample size calculation was performed.

Statistical analysis

Descriptive statistics were used to summarise characteristics of the cohort. Associations between characteristics and engagement status were assessed using Chi-squared tests for categorical variables and Mann-Whitney-Wilcoxon tests for continuous variables. We used logistic regression for univariate analyses with engagement as the dependent variable. All variables apart from the SOFA score were included in a multivariable logistic regression. We present odds ratios with associated 95% confidence intervals. Variance inflation factors (VIFs) were calculated for all predictors in the final multivariable logistic regression model to assess multi-collinearity. We included an interaction term between ethnicity and IMD quintiles in a multivariable logistic regression model as a statistical test for intersectionality. An intersectional visualisation technique was used to explore the interaction between IMD quintiles and ethnicity. We examined patterns across these intersectional groups using a heat map, allowing visual interpretation of engagement rates and group counts. All analyses were performed using R software and associated packages ggplot2 (R software foundation, Vienna, version 4.4.3).

Excluded Datasets

From the total 3058 patients discharged from critical care over the data collection period, we excluded a total of 867 from the analysis either because they had no opportunity to engage with the follow-up service or because missing data could have introduced misclassification or bias (see figure 1). We excluded 604 datasets as the patients did not survive to critical care or hospital discharge and therefore would not have had the opportunity to engage with the service. We excluded 137 datasets as they did not have at least one form of valid contact detail and therefore would not have been given the opportunity to engage in the electronic format of this service. We excluded a further 126 datasets due to incomplete data to minimise the risk of misclassification, including 80 datasets missing severity of illness (APACHE II and SOFA) scores, 40 missing postcodes (precluding assignment of IMD), and 6 with missing frailty data.

Results

Participants

From a total of 3058 critical care survivors, 2191 (72%) had complete data sets and survived to hospital discharge (Figure 1). Patient characteristics are summarised in Table 1. In brief, ICU survivors, had an average age of 53 years (range 39-67), were predominantly male (1382/2191, 63%), half were of White ethnicity (1101/2191, 50%), living in areas of high socioeconomic deprivation (1216/2191, 56% from the lowest 3 IMD deciles) and were admitted under medical (800/2191, 36%), neurosurgical (301/2191, 14%), surgical (652/2191, 30%) and trauma specialities (438/2191, 20%). We describe the characteristics and outcomes of patients with missing data (supplementary material table 1).

Table 1: Patient characteristics for overall cohort (n=2191), stratified for engagement.

Numbers are presented as n (% of total) unless otherwise stated. To calculate p values, Mann-Whitney U was used for continuous data and chi-squared tests for categorical data. Data regarding residence prior

to admission has been omitted for data integrity concerns. IMD quintiles based on IMD rank within the cohort.

	Engagement Status		
	Non-Engaged (n=1552)	**Engaged (n=639)**	**p-value**
AGE	56 (39 to 68)	54 (39 to 66)	0.14
ETHNICITY			
Asian	360 (23.2%)	136 (21.3%)	<0.05
Black	266 (17.1%)	74 (11.6%)	<0.05
Mixed/Other	69 (4.4%)	33 (5.2%)	<0.05
Not stated	103 (6.6%)	49 (7.7%)	<0.05
White	754 (48.6%)	347 (54.3%)	<0.05
SEX			
Female	565 (36.4%)	244 (38.2%)	0.46
Male	987 (63.6%)	395 (61.8%)	0.46
IMD QUINTILES			
1 - most deprived	326 (21%)	112 (17.5%)	<0.05
2	327 (21.1%)	111 (17.4%)	<0.05
3	316 (20.4%)	122 (19.1%)	<0.05
4	293 (18.9%)	145 (22.7%)	<0.05
5 - least deprived	289 (18.6%)	149 (23.3%)	<0.05
FRAILTY			
Frail	272 (17.5%)	76 (11.9%)	<0.05
Not frail	1280 (82.5%)	563 (88.1%)	<0.05
MAX ORGAN SUPPORT			
0	29 (1.9%)	12 (1.9%)	0.47
1	816 (52.6%)	346 (54.1%)	0.47
2	489 (31.5%)	200 (31.3%)	0.47
3	201 (13%)	79 (12.4%)	0.47
4	17 (1.1%)	2 (0.3%)	0.47
ADMITTING SPECIALITY			
Medical	582 (37.5%)	218 (34.1%)	<0.05

Neurosurgery	219 (14.1%)	82 (12.8%)	<0.05
Surgical	427 (27.5%)	225 (35.2%)	<0.05
Trauma	324 (20.9%)	114 (17.8%)	<0.05
SOFA SCORE	4 (2 to 5)	3 (2 to 5)	<0.05
APACHE II SCORE	13 (10 to 17)	12 (9 to 16)	<0.05
CRITICAL CARE LOS	6 (4 to 11)	6 (4 to 10)	0.12

***APACHEII* Acute Physiology and Chronic Health Evaluation II, *IMD* Indices of Multiple Deprivation, *LOS* Length of Stay, *SOFA* Sequential Organ Failure Assessment**

Patient outcomes

A large proportion of the patients (1558/2191, 71%) did not engage with the follow up service (Table 1). Median age and sex distribution did not differ significantly between groups, however there were significant differences in ethnicity and socioeconomic status (measured by IMD). In univariate logistic regression patients of Black ethnicity had significantly lower odds of engagement compared to those of White ethnicity (OR = 1.65, CI = 1.25-2.22). This association remained significant after adjusting for age, sex, level of frailty, admission speciality, and illness severity in the multivariable logistic regression model (aOR = 1.69, CI = 1.25-2.28). Similarly in univariate analysis, patients from more socioeconomically deprived areas had lower odds of engagement. Compared to those in the least deprived IMD quintile, individuals in more deprived quintiles had significantly lower odds of engagement, noticeably in IMD Quintile 1 (OR = 1.5, CI = 1.12-2.01). and 2 (OR = 1.52, CI = 1.13-2.04). This relationship also remained significant in the multivariable model (IMD 1 aOR = 1.39, CI = 1.03-1.88 and IMD 2 aOR = 1.46, CI = 1.08-1.98) (Table 2, Figure 2). Scaled generalised VIFs ranged from 1.01 to 1.22, indicating no evidence of multicollinearity among the included variables. The introduction of an interaction term to the logistic model (measured with ANOVA), resulted in no significant difference.

Table 2: Logistic regression analysis:

Numbers are presented as OR (CI) or the p value. For categorical data, the reference category is stated in the table.

	UNIVARIATE ANALYSIS		MULTIVARIABLE ANALYSIS	
VARIABLE	**Unadjusted OR**	**p value**	**Adjusted OR**	**p value**
AGE	1.04 (0.99-1.09)	0.13	1.04 (0.98-1.11)	0.18
SEX				
Male	1.08 (0.89-1.3)	0.43	1.2 (0.99-1.47)	0.07
Female	Reference category		Reference category	
ETHNICITY				
Asian	1.22 (0.96-1.54)	0.1	1.24 (0.97-1.6)	0.08
Black	1.65 (1.25-2.22)	<0.05	1.69 (1.25-2.28)	<0.05
Mixed / Other	0.96 (0.63-1.5)	0.86	0.99 (0.64-1.55)	0.97
Not stated	0.97 (0.68-1.4)	0.86	0.98 (0.68-1.43)	0.92
White	Reference category		Reference category	
IMD QUINTILE				
1 – most deprived	1.5 (1.12-2.01)	<0.05	1.39 (1.03-1.88)	<0.05
2	1.52 (1.13-2.04)	<0.05	1.46 (1.08-1.98)	<0.05
3	1.34 (1-1.78)	<0.05	1.26 (0.93-1.69)	0.13
4	1.04 (0.79-1.38)	0.77	1 (0.75-1.34)	0.98
5 – least deprived	Reference category		Reference category	
MAX ORGAN SUPPORT				
0	1.02 (0.53-2.11)	0.94	0.82 (0.41-1.64)	0.57
1	Reference category		Reference category	
2	1.04 (0.84-1.28)	0.73	1.05 (0.84-1.31)	0.69
3	1.08 (0.81-1.45)	0.61	1.13 (0.8-1.59)	0.49
4	3.6 (1.03-22.81)	0.09	0.39 (0.09-1.73)	0.21
APACHE II SCORE	1.02 (1.01-1.04)	<0.05	1.02 (1-1.04)	0.11
FRAILTY				
Frail	1.57 (1.2-2.08)	<0.05	1.5 (1.12-2.01)	<0.05
Not frail	Reference category		Reference category	
CRITICAL CARE LOS (days)	1.01 (1-1.02)	<0.05	1.01 (1-1.02)	0.08

ADMITTING SPECIALITY				
Neurosurgery	1 (0.74-1.35)	1	1.15 (0.83-1.59)	0.40
Surgical	0.71 (0.57-0.89)	<0.05	0.75 (0.59-0.95)	<0.05
Trauma	1.06 (0.82-1.39)	0.64	1.27 (0.96-1.69)	0.09
Medical	Reference category		Reference category	

***APACHE II* Acute Physiology and Chronic Health Evaluation, *IMD* Indices of Multiple Deprivation, *LOS* Length of Stay**

Adjusted odds ratios and 95% confidence intervals for all variables used in multivariate logistic regression analysis. Reference categories same as shown in Table 2. An odds ratio of >1 shows factors associated with non-engagement (i.e. that make you more at risk of non-engagement), whereas an odds ratio of <1 shows factors associated with engagement.

Further analysis of our data was conducted to understand the intersecting impact of socioeconomic status and ethnicity on an individual's ability to engage. A heat map (Figure 3) allowed us to distinguish patterns of non-engagement, including the groups revealed by the traditional single-factor analyses: IMD quintiles 1 and 2 and Black ethnicity groups. Obscured at-risk groups were revealed, including a large group of White individuals living in areas of high deprivation and a small group of individuals from Black ethnic backgrounds living in the least deprived areas with the highest rate of non-engagement. Although not statisticallysignificant, this analysis revealed hidden populations outside of the categories defined by the single-factor analyses; including a large group of Asian ethnicity individuals from mid to low socioeconomic deprivation (IMD quintiles 3 and 4) with poor engagement.

Discussion

We found distinct social and demographic patterning in non-engagement with the critical care follow-up service. Patients from more socioeconomically deprived areas and those from Black ethnic backgrounds had consistently higher odds of non-engagement, even after adjusting for confounders. Intersectional visualisation further demonstrated substantial variation in non-engagement rates across combined ethnicity and IMD strata, alongside marked differences in the size of the populations represented within each stratum (Fig. 3).

To understand these patterns more comprehensively, we applied two analytical approaches. Using traditional single-factor logistic regression, we identified individuals from IMD quintiles 1 and 2 and those of Black ethnicity as having higher odds of non-engagement. However, when we applied an

intersectional approach, visualised in Fig. 3, we uncovered a sizeable additional group of individuals with high rates of non-engagement that was not visible through single-factor methods. Although these groups did not always exhibit the highest relative odds of non-engagement, they collectively represented a substantial proportion of the ICU survivor population.

An important methodological distinction between these approaches is that odds ratios derived from logistic regression quantify relative risk but do not account for the absolute size of the populations affected. Consequently, groups with moderately elevated non-engagement rates but large population sizes may represent a substantial proportion of unmet need, despite appearing less prominent in regression-based analyses. By jointly considering non-engagement rates and population size, the intersectional approach revealed additional at-risk groups, including individuals of Black ethnicity in less deprived areas and Asian individuals from IMD quintiles 3 and 4, patterns not evident using single-factor methods alone.

Taken together, these findings demonstrate that reliance on conventional regression approaches alone may obscure important population-level patterns of non-engagement, and may underestimate the true scale and distribution of unmet need, potentially overlooking groups who may benefit from targeted or tailored follow-up interventions. This may have important implications for policy development. Our results underscore the added value of intersectional approaches in uncovering both visible and obscured dimensions of inequity in access and engagement with healthcare services.

Our findings largely align with existing literature, which describes lower engagement in ethnic minority groups due to barriers such as language, lower health literacy, and cultural mismatch (33, 43, 44). Lower engagement is associated with worse health outcomes, including higher readmission rates, increased morbidity and reduced quality of life (45). There is also a well-established association between socioeconomic disadvantage and poorer healthcare access and outcomes among critical care survivors (28, 46, 47). Additionally, broader healthcare utilisation disparities across ethnic groups have been documented in national English datasets (29). However, much of the evidence has examined ethnicity and socioeconomic status as separate determinants, or has focused on attendance versus non-attendence without explicitly considering how these factors interact. While some studies describe characteristics of patients who do not engage with follow-up services, few have applied quantitative approaches to identify intersecting patterns of risk across social identities (35, 36). To that end, the additional groups identified through our intersectional analysis - specifically individuals of Black ethnicity in the least deprived areas and the large group of Asian individuals from IMD quintiles 3 and 4 - are less well described in existing literature. As these patterns do not emerge in single-factor approaches, such groups may be systematically overlooked in existing evidence, underscoring the need for further work to understand the mechanisms driving their lower engagement. Although intersectionality has been widely applied in qualitative research, it’s use in quantitative research is more recent, with growing evidence of it’s analytical value (48, 49). However, intersectional analysis risks being applied superficially, with one systematic review highlighting that the theory is frequently misunderstood with only simplistic

descriptive analysis of demographic data being conducted with no consideration of wider social context (50).

Strengths and limitations

A key strength of this study is the use of intersectional visualisation techniques, which allowed for a more detailed exploration of non-engagement patterns across both demographic factors and social dimensions that are often examined in isolation. This approach helped reveal both small but high risk groups and large populations with unmet need, offering novel insights to inform policy and practice. The diversity of the study population facilitated this comprehensive analysis, revealing inequities that may not have been apparent in less heterogeneous cohorts. Although those without valid contact details were excluded from data analysis, reliance on electronic communication may have disadvantaged individuals experiencing digital poverty and/or poor digital literacy. Digital poverty itself was unlikely to be a major driver of non-engagement given the small number excluded for having no telephone or email contact details (137/3058, 4% of the total population), however digital literacy remains a potentially important and underexplored barrier in this population. Comparable services within the same NHS Trust have achieved engagement rates of up to 60–80%, suggesting that digital exclusion alone does not fully explain the lower response rate observed in our population. Data integrity and inaccuracies may have introduced a source of bias and influenced the findings. Additionally, as this questionnaire was distributed via an automated service to a population which is heterogeneous in it's recovery trajectory and timeline, it is likely that for some it did not coincide with a point at which they were clinically able to complete it or considered it relevant. To mitigate this, reminder messages were sent including a second distribution four weeks later. Finally, as this study was conducted in a single large inner-city trauma centre, the results may not be fully generalisable to other settings with different population profiles or service structures.

Implications for future practice

Our findings emphasise the need for tailored engagement strategies that account for intersecting identities and structural barriers, rather than focussing on single factors in isolation. Intervention developers must recognise that disadvantage rarely exists in a vacuum, but rather through the compounding intersecting effects of multiple factors. Embedding intersectionality into intervention design is therefore essential to ensure that engagement strategies meet the complex needs of critical care survivors and reduce inequities in access.

Implications for future research

Routinely collected hospital data fail to capture many key structural determinants of non-engagement. Evidence suggests that greater social support is associated with improved engagement (51). Components of social support such as informal care arrangements and insecure housing will affect an individual's ability to engage, however they are poorly recorded or absent from hospital datasets. Linkage to social care records will provide some of the answers, however a comprehensive understanding of

engagement in this population will require prospective and considered data collection to ensure all relevant determinants are considered. Future research will need to employ codesign methodologies to ensure relevance and responsiveness to the needs of critical care survivors and their communities. A caveat is that co-design processes often attract individuals who are already engaged, which risks overlooking the perspectives of those less likely to participate. Using pre-existing trusted community pathways and networks to reach and involve groups who might otherwise remain disengaged may mitigate this. Local faith groups, community centres, peer support networks, or voluntary organisations with established relationships can help build trust and facilitate access to underrepresented groups. It is also important to note, that studies evaluating tailored engagement interventions in other areas of healthcare rarely achieve universal engagement (52–55). This suggests that a more nuanced approach may be required when designing engagement strategies, one that considers multiple intersecting factors and the frequency of a variable alongside its relative odds.

Conclusions

The method of analysing disparities and risk factors for non-engagement can significantly affect which populations are revealed to be at risk. Failure to account for intersectionality risks designing interventions that are ineffective or inequitable, ultimately perpetuating existing disparities in recovery outcomes for critical care survivors. Incorporating intersectional approaches into the evaluation of critical care follow-up services can improve service design, resource allocation, and equity of recovery after critical illness.

Declarations

Ethics Approval

Research ethics approval was obtained from Yorkshire and The Humber - Leeds West Research Ethics Committee (reference number 23/YH/0146, 22.08.2023). This study is reported in line with the STROBE checklist for cohort studies and was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

Consent to participate

Informed consent was obtained by continuation to complete questionnaire.

Consent to publish

Not applicable as using data in an anonymised manner in publication.

Availability of data and materials

Source data from this study is not publicly available as GDPR compliant de-identification within a geographically limited dataset addressing protected characteristics and sensitive healthcare data

cannot be ensured. The lead author is happy to consider reasonable requests for aggregated results for additional analyses.

Competing Interests

ZP has received honoraria for consultancy from GlaxoSmithKline, Lyric Pharmaceuticals, Faraday Pharmaceuticals and Fresenius-Kabi, educational support from Baxter and Nestle Health Science and speaker fees from Orion, Baxter, Sedana, Fresenius-Kabi and Nestle. RP undertakes paid consultancy work for Mode Sensors. SN, AJF, AA, TS, JS, JP and YW have no competing interests to declare.

Funding

This study was supported by Barts Charity (IRAS number 318066). They had no role in the design, collection, analysis or interpretation of the data, nor in writing or decision to submit the manuscript.

Authors' contributions

SN, TS, JS and ZP conceived and designed the study.

SN, AA and AJF performed the analyses with input from JP, YW and RP.

SN, AJF and ZP drafted the initial manuscript.

All authors approved the final version of the manuscript.

Acknowledgments

The authors thank the critical care audit team at The Royal London Hospital and all patients whose data contributed to this study.

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Figures

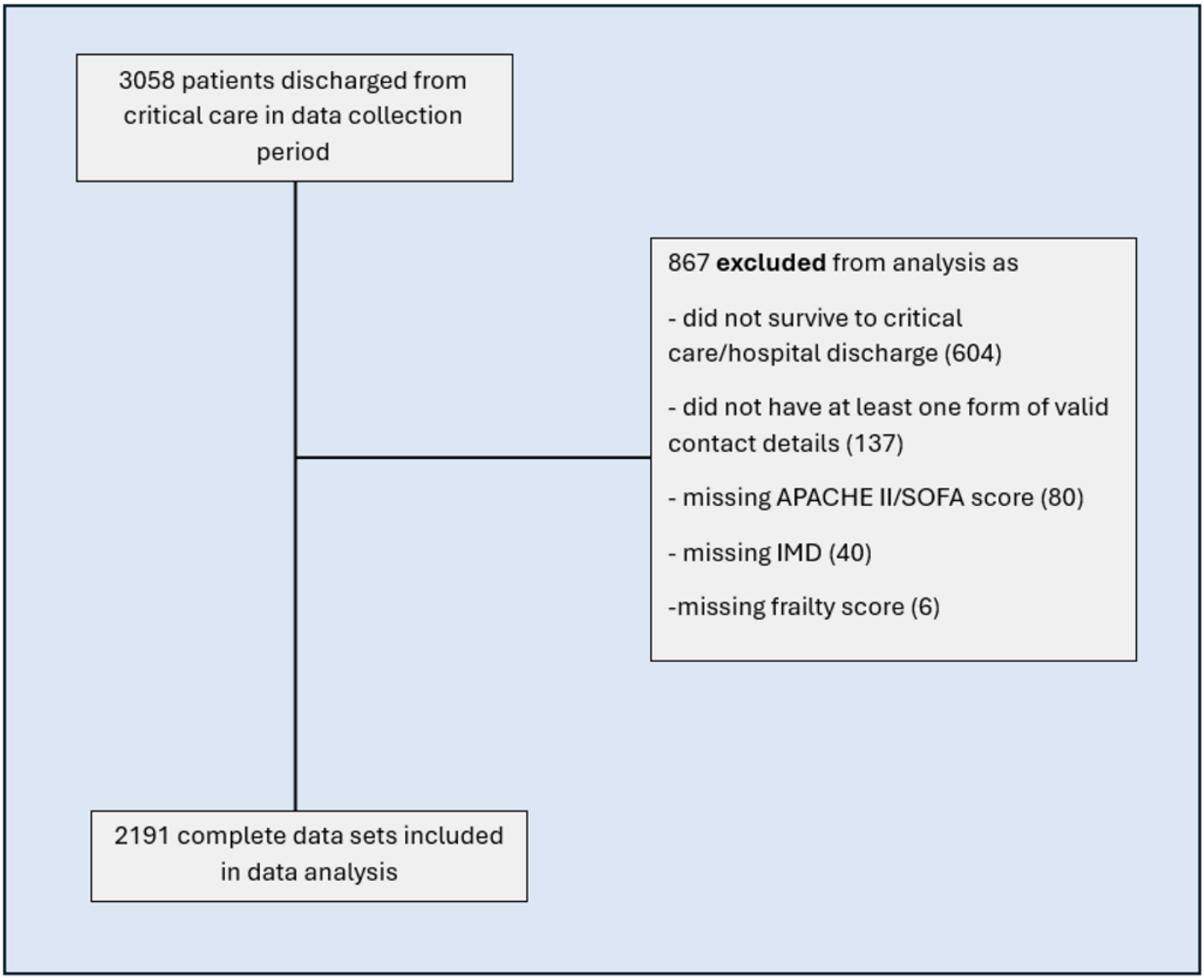


Figure 1

Flow diagram describing those we excluded from subsequent data analysis. Summary of incomplete data sets can be found in supplementary material.

APACHE II **Acute Physiology and Chronic Health Evaluation II,** ***IMD*** **Indices of Multiple Deprivation,** ***SOFA*** **Sequential Organ Failure Assessment**

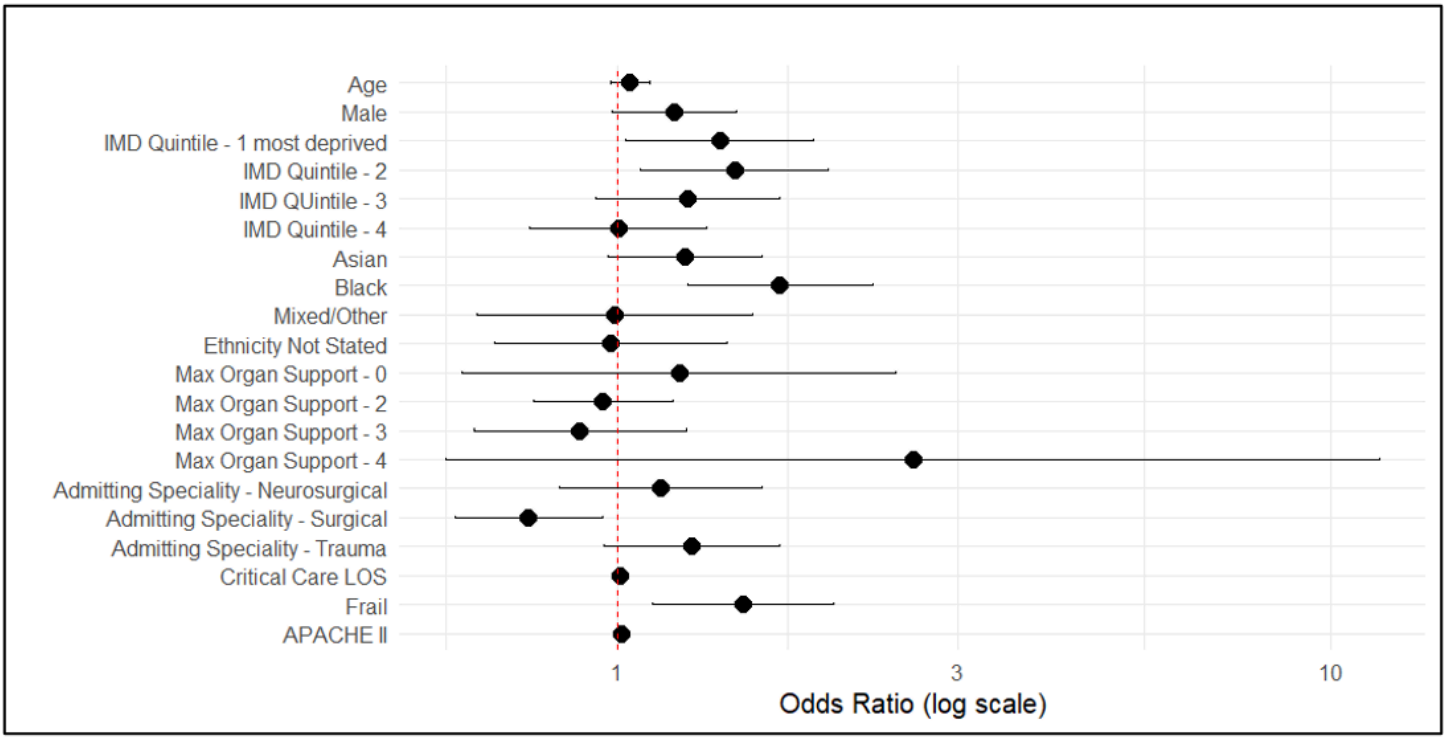


Figure 2

Forest plot depicting the odds ratios for factors associated with non-engagement

APACHE II **Acute Physiology and Chronic Health Evaluation II,** ***IMD*** **Indices of Multiple Deprivation,** ***LOS*** **Length of Stay**

Proportion of non-engagement

IMD Quintile	Asian		Black		Mixed/Other		Not stated		White	
1 - most deprived	100	70%	92	78%	21	81%	20	90%	205	73%
2	125	79%	85	75%	19	53%	30	73%	179	74%
3	123	72%	69	83%	21	62%	20	65%	205	70%
4	88	74%	61	70%	19	68%	43	63%	227	64%
5 - least deprived	60	62%	33	91%	22	73%	39	59%	284	64%

% Rate of non-engagement: 90 … 50

IMD **Indices of Multiple Deprivation**

Figure 3

A visualisation of the intersectionality of engagement:

This figure heat maps the percentage of non-engagement with the follow-up service in our cohort by ethnicity and socioeconomic status (represented by IMD Quintile). n= number of people in each group, followed by % rate of non-engagement, and the colour represents the non-engagement rate in the critical care follow up service (see scale).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryMaterialsSairaNazeer.docx