

Health Care Utilization in ARDS Survivors 2–3 Years After Discharge

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Introduction

ARDS is a common condition, with a prevalence of ~10% in ICU patients.^{1,2} Due to a decrease in (in-hospital) mortality of ARDS, interest in long-term outcomes of survivors of ARDS, such as health-related quality of life or return to work, has increased during the past decades.³ However,

long-term health-care utilization of survivors of ARDS after discharge from the ICU has received comparatively little attention, although studies have demonstrated long-term physical, mental, and cognitive impairments, and reduced quality of life, and, thus, the need for treatment in survivors of ARDS.⁴⁻⁶

Brandstetter et al⁷ reported in-patient and out-patient health-care utilization of survivors of ARDS in Germany for the first 12 months after discharge from ICU by using data from a prospective patient cohort study.^{8,9} They concluded that the first year after ARDS is characterized by extensive health-care utilization, especially in-patient health care. For instance, 90% of the study sample had at least 1 additional hospital stay after discharge from the hospital.⁷ However, the question arises whether this pattern of elevated health-care utilization persists after the first critical 12 months or whether a decrease or even normalization is noticeable longitudinally. (See Ruhl et al¹⁰ for a 5-year longitudinal cohort study from the United States.) To extend findings on health-care utilization beyond the first 12 months, the present article reports the long-term health-care utilization of survivors of ARDS during the first 3 years after discharge from the ICU by using further follow-up data from the DACAPO study.⁷

Methods

A prospective multi-center patient-cohort study with 877 adult survivors of ARDS from different ICUs across Germany was conducted from 2014 to 2016 (DACAPO study).^{8,9} After discharge from the hospital, the patients received questionnaires at 5 follow-ups (3, 6, 12, 24, and 36 months after discharge). The methods of DACAPO, including specifications of the study sample, are reported elsewhere in detail.^{7,8,11} The ethics committee of the University of Regensburg approved the study (13-101-0262). For the present brief report, we analyzed data collected at 12, 24, and 36 months after discharge. In total, 587 participants returned at least 1 valid questionnaire and were included in the study sample.

At each follow-up, the participants stated their extent of (a) out-patient and (b) in-patient health-care utilization during

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The study was approved by the ethics committee of the University of Regensburg (13-101-0262) and (if required), in addition, by the ethics committees of the participating hospitals. Written informed consent was obtained from 1,225 patients. Written informed consent was given by the patients or their caregivers or legal guardians during length of stay.

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Table 1. Out-Patient Visits of Medical Specialists (12, 24, and 36 mo after discharge from the ICU)

Specialist	Out-Patient Visits at Least Once During the Past Year, %		
	12 mo (n = 396)*	24 mo (n = 218)	36 mo (n = 202)
General practitioner	93.5	90.4	95.0
Internist	56.5	54.1	53.0
Gynecologist (only women)	41.1	49.4	52.2
Ophthalmologist	32.6	34.9	39.1
Orthopedist	21.8	22.5	30.7
Otolaryngologist	25.4	22.9	23.8
Neurologist/psychiatrist	31.6	23.4	21.8
Psychotherapist	14.0	11.0	12.9
Surgeon	20.7	15.6	17.3
Dermatologist	17.9	18.3	18.3
Radiologist	36.8	35.3	38.1
Dentist, orthodontist	58.0	67.0	69.3
Other	13.2	15.1	16.8
Any specialist	100	97.1	98.8

*From reference 7.

the previous 12 months. To assess out-patient health-care utilization, the participants stated whether and how often they visited any of 13 medical specialists (Table 1). To obtain information about in-patient treatment, the participants stated how many nights they spent in in-patient care (including stays in hospital wards, ICUs, and rehabilitation units). Results are presented on a descriptive level. Median and interquartile range (IQR) or mean \pm SD are reported for continuous variables, and counts and percentages are reported for categorical variables.

Results

Sample sizes were 396 participants at 12 months of follow-up (mean \pm SD age at inclusion in the study, 55.0 \pm 14.4 y; 66.7% men), 218 at 24 months (53.6 \pm 14.4 y; 64.7% men), and 202 at 36 months (53.7 \pm 14.6 y; 66.8% men). The median (IQR) Sequential Organ Failure Assessment scores as proxies for morbidity at admission (without the Glasgow coma scale) were 8 (6–10), 8 (6–8), and 8 (6–8) at 12, 24, and 36 months, respectively.

Out-Patient Health-Care Utilization

The main results for out-patient health-care utilization for all 3 follow-ups are presented in Table 1. Visits to the gynecologists and dentist increased consistently over time for > 10% between 12 and 36 months (+11.1% and +11.3%, respectively), whereas visits to the neurologist/psychiatrist decreased for > 10% between 12 and 36 months (–10.2%).

Visits to all other specialists remained relatively constant (total change rate < 10%). Almost all the participants visited at least 1 specialist during 1 year at all follow-ups.

The total number of medical specialists visited remained constant throughout the study period. The median (IQR) total yearly visits to out-patient health-care providers were 15 (8–25), 14 (8–21), and 14 (8–25) at follow-ups 12, 24, and 36 months, respectively. The median (IQR) visits to general practitioners alone were 7 (4–12), 6 (4–12), and 5 (4–12), whereas the median (IQR) visits to medical specialists, excluding general practitioners, were 8 (4–14), 7 (4–12), and 8 (4–15). Furthermore, the participants visited median (IQR) 4 (3–6) different medical specialists, including general practitioners (excluding general practitioners: 3 [2–4/5] at all follow-ups).

In-Patient Health-Care Utilization

In terms of in-patient health-care utilization, 90% of the participants reported at least 1 additional in-patient stay (including rehabilitation treatment provided by rehabilitation facilities) within the first 12 months after discharge from the hospital, as opposed to 37.9% and 37.2% after 24 and 36 months, respectively. This pronounced decrease in in-patient health-care utilization after 12 months was also reflected in the days of hospitalization (Fig. 1). After 12 months, the median (IQR) hospitalization days were 48 (31–76), whereas after 24 and 36 months, the median (IQR) number of days decreased to 8 (4–18) and 10 (4–18), respectively.

Discussion

The present study sheds light on the long-term health-care needs of survivors of ARDS in the in-patient and the out-patient sectors. By describing the extent to which survivors of ARDS use out-patient and in-patient health care up to 36 months after discharge, this study extends the results of a previous study on the same cohort of survivors of ARDS.⁷ With regard to the out-patient health-care utilization, the total amount of visits to various specialists remained relatively constant throughout the 3 years, although with a high variability among the participants at any follow-up, as indicated by the IQRs. Of note, there was a large increase for gynecologists and dentist visits. This might be an indication for a “return to normal” after the first critical year. The decrease of neurologist/psychiatrist visits supports this interpretation.

An evaluation of the extent of health-care utilization in comparison with the general German population is possible by looking at the following 2 data sources (from years around the study conduct): results from the representative German Health Interview and Examination Survey for Adults (DEGS1)¹² and population representative results on

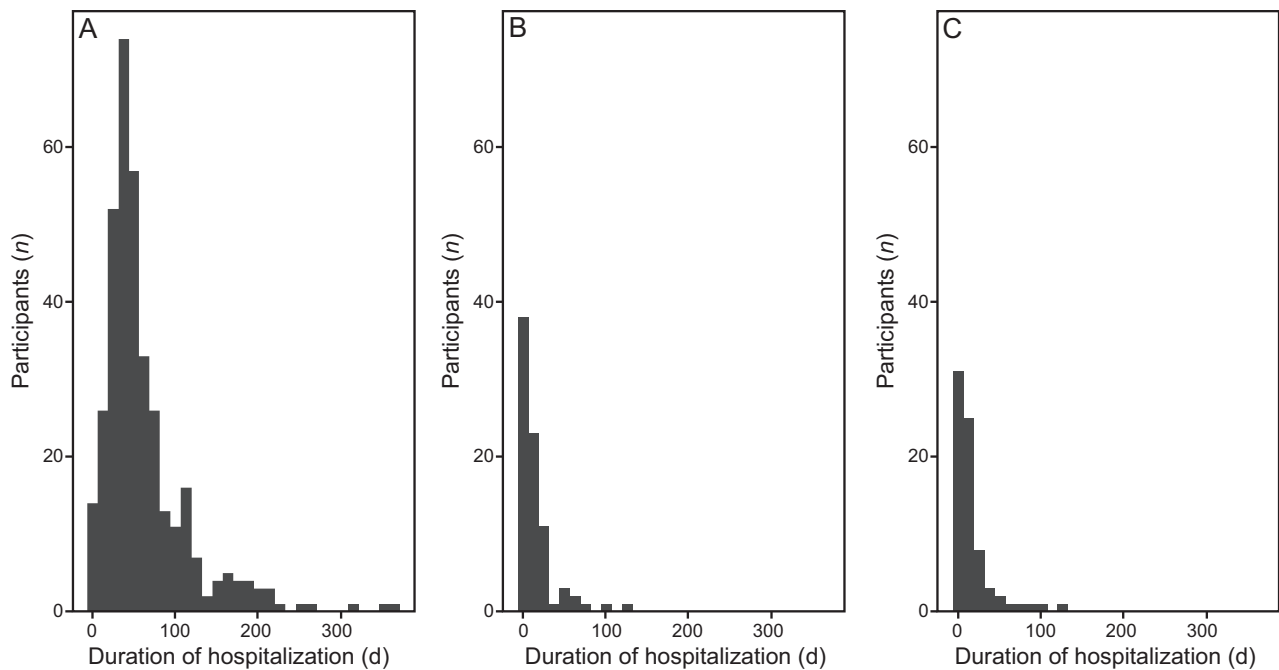


Fig. 1. The number of days of hospitalization A: 12 months, B: 24 months, and C: 36 months after ICU discharge.

health-service use from one of the largest German health insurances BARMER GEK.¹³ Most notably, in our sample health-care utilization of the following specialists was still markedly elevated (>10%) after 36 months compared with the German population: general practitioner, internist, ophthalmologist, neurologist/psychiatrist, psychotherapist, radiologist. This finding indicates that, even 3 years after discharge, survivors of ARDS need a comparatively high amount of out-patient health care in many areas. Even when considering only the oldest segment of the general German population (ages 60–79 y),¹² utilization rates of our sample remain clearly elevated for these specialists, with the exception of ophthalmologists.

In-patient health-care utilization was characterized by a high utilization during the first 12 months, followed by a pronounced decrease. However, even after 24 and 36 months, in-patient health-care utilization was still more than twice as high than the general German population's 16%.^{13,14} Even when considering only the oldest segment of the population (ages >66 y), of whom 26% report at least 1 hospital stay during the past 12 months, DACAPO study survivors show higher rates for in-patient visits, even 36 months after discharge from the ICU. Thus, similar to out-patient health-care utilization, in-patient health care is characterized by a comparatively high utilization throughout the first 3 years after discharge. In a review on the long-lasting effects of ARDS, Mart and Ware⁵ cite 3 studies that report hospital (re)admission rates of survivors of ARDS up to 2 years after discharge of 39%, 40%, and 53%. The lower limit is close to our findings for 24 and 36 months after

discharge, whereas the discrepancy to the rate of ~90% during the first year in our analyses might be at least partly explained by the inclusion of rehabilitation facilities.

When interpreting the results of the present report, some limitations need to be considered. First, the reasons for non-response between follow-ups are unknown. For instance, it is possible that participants who were highly morbid could not participate and thus results are underestimating the actual health-care utilization. Second, the average age of our sample was comparatively high, due to the nature of the illness. This needs to be kept in mind when comparing the results with the German population. Similarly, pre-admission morbidity is unknown. It is likely that the participants were already less healthy than the population average before admission to the ICU.¹⁵ In conclusion, out-patient and in-patient health-care utilization remained high for survivors of ARDS even after 36 months, which reflects a persistent high morbidity within this population. Health-care providers need to be aware of this. More research is needed to identify factors that support long-term recovery of survivors of ARDS.

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