

Healthcare Service Utilization Patterns and Patient Experience in Persons With High Healthcare Needs: A Comparison Across 22 Countries

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Abstract

Background

Persons with complex health conditions, e.g. spinal cord injury (SCI), frequently visit numerous clinical settings. Their service utilization and patient experience is a comprehensive indicator of how a system is functioning overall. This study compared the patient experience of persons with chronic SCI in relation to healthcare service utilization patterns in 22 countries, hypothesizing that primary-care oriented patterns would offer better experience.

Methods

This study was based on International Spinal Cord Injury Survey with 12 588 participants from 22 countries worldwide. Utilization clusters were identified by cluster analysis, experience score was attained by partial credit model. The association between the two was explored by regression analysis.

Results

Highest share of visits was to primary care physician (18%) and rehabilitation physician (16%). Utilization patterns had diverse orientation: from primary care to specialized and from inpatient to outpatient. The experience was reported as very good and good across different dimensions: 78% reported respectful treatment; 75% – clear explanations; 71% – involvement in decision making; 63% – satisfaction with care. Average experience score on 0-100-point scale was 64, highest – 74 (Brazil) and lowest – 52 (Japan, South Korea). Service utilization patterns were associated with patient experience, but no uniformly better patient experience was found for neither primary or specialized care-oriented systems.

Conclusion

While there are distinct utilization patterns between countries of how persons with chronic SCI use the healthcare system, neither the more primary care oriented nor the specialized care system leads to a uniformly better patient experience.

Introduction

The design of healthcare system and healthcare provision models play a key role in obtaining the desirable health outcomes.¹ It is rather a complex question how to organize the healthcare provision, and even much so for persons with complex health conditions and high healthcare needs. The more severe the condition a person has, the less likely they are to receive comprehensive care², which in a vicious cycle, is leading to worsening of their health condition.³

Persons living with spinal cord injury (SCI) utilize numerous clinical settings with high frequency for follow-up treatment of acute secondary health conditions.⁴ Their service utilization and patient experience are a comprehensive indication of how well the health system is functioning, considering that the system is not tailored for this patient group.⁵

The overall objective of this study is to identify the healthcare system most responsive to patient needs across 22 countries by classifying the healthcare utilization pattern of persons with chronic SCI and relating this to the patient experience. Specifically, this cross-sectional study aims to understand: 1) What are the healthcare service utilization patterns among persons living with chronic SCI in different countries? 2) What is the patient experience with healthcare among persons with chronic SCI in different countries? 3) Is patient experience with healthcare related to healthcare utilization patterns and what care models assure better patient experience? Study hypothesis is that persons with chronic SCI who rely more on primary care report better care experience. Primary care is associated with higher patient satisfaction as it is shown to ensure trust and longitudinal relationship between the doctor and the patient.⁶⁻⁸

Methods

Data collection and sampling

This study relies on the International Spinal Cord Injury (InSCI) cross-sectional, community-based, questionnaire survey conducted in 2017-2019.⁹ InSCI is the first international survey that aims to describe the lived experience of persons living with chronic SCI in the community. The survey is part of the International Learning Health System for Spinal Cord Injury Study (LHS-SCI), which is embedded in the World Health Organization's Global Disability Plan.¹⁰ LHS-SCI was launched in 2017 with the support of the World Health Organization (WHO), the International Society for Physical and Rehabilitation Medicine (ISPRM) and the International Spinal Cord Society (ISCoS).¹⁰ InSCI covers 22 countries across all WHO regions and was planned to be repeated every five years. The survey's role is to gather data for further analysis leading to policy and practice changes, aimed at strengthening rehabilitation and other services both for persons with SCI and the general population.¹¹

The study population included adults with SCI living in the community across 22 countries: Australia, Brazil, China, France, Germany, Greece, Indonesia, Italy, Japan, Lithuania, Malaysia, Morocco, The Netherlands, Norway, Poland, Romania, South Africa, South Korea, Spain, Switzerland, Thailand, and the USA. The study participants were adults eighteen years old or older with non-traumatic or traumatic SCI. Those receiving first rehabilitation or first acute care during the data collection were excluded from the study due to the lack of experience of living with SCI in the community.⁹

Each participating country had a national study center that led the questionnaire translation, data collection and adaptation, reminder management etc. Swiss Paraplegic Research in Nottwil, Switzerland, coordinated InSCI and provided recommendations on sampling as well as data collection, storage, and analysis.⁹ Sampling frames were formed from national registries of persons with SCI, from databases of academic or level I trauma hospitals, from clinical records of specialized rehabilitation centers, or from membership registries of organizations for persons with disability or insurance agencies.⁹ The 125-item

questionnaire had different data collection options, depending on the country, including paper-pencil or online questionnaire, telephone or face-to-face interviews. Each country obtained ethical approval for conducting the survey and informed consent was signed by each study participant or participant's authorized representative. Collected data were de-identified and stored in a secure central database.⁹

In this study, we measure experience through Patient Reported Experience Measures (PREMs), which represent the perception of a personal experience of the received healthcare.^{12, 13}

Data analysis and management

By means of an unsupervised cluster analysis, countries' health systems were classified with regards to healthcare service utilization among persons with SCI. Cluster analysis was based on the visits to 12 types of health providers and the number of hospital stays, in the last 12 months before completing the survey. For each country, the relative share in percentage of visits to each provider, or of no visit to any provider, were computed, as well as the percentage of individuals with no, one, two or more than three inpatient hospitalizations. Hierarchical cluster analysis was conducted on a dissimilarity matrix based on Gower distance and Ward's methods linkage.

Experience while receiving healthcare services was measured by four five-point Likert scale survey questions on: respectful treatment; clear explanations; involvement in decision making; satisfaction with healthcare. A partial credit model was applied to attain an interval-scaled experience (PREM) score for each individual, which were scaled to a 0-100 range. The experience scores were then averaged per country. The partial credit model assumptions were tested by checking ordered categories via graphs; local independence test; differential item functioning tested on the different characteristics (sex, age, SCI type, and SCI degree); unidimensionality test through running principal component analysis and factor analysis on polychoric correlations.

The association of PREM score as a dependent variable with utilization cluster as independent variable was explored by means of univariate and multivariable regression analysis. We adjusted by the nonmodifiable socio-demographic (sex, age, migration background) and spinal cord injury characteristics (tetra- or paraplegia, complete or incomplete lesion, traumatic or nontraumatic etiology, years lived with injury). All statistical analyses were conducted using Stata 16.

Results

Socio-demographic characteristics of study participants

The survey was conducted among 12 588 participants, as three participants had to be deleted from the study after a data quality check. The response rates were only available for countries with predefined sample frames and are the following: South Africa 54%, Norway 42%, Switzerland 39%, Netherlands 33%, Germany 32%, Poland 32%, Australia 27%, China 23%.¹⁴ The sample was predominantly male (73%), with an average age of 51 years, mostly without migrant background (91%) and living with others (77%). The majority of the participants had paraplegia (61%) for 13 years on average with incomplete lesion (60%) and traumatic etiology (80%) (Table 2).

Healthcare utilization

The healthcare providers with highest share of visits in the last 12 months were primary care physician (share of 18% among all healthcare providers) and physical and rehabilitation medicine (PRM)/SCI physician (16%), followed by other specialist physicians (11%) and physiotherapist (13%) (Table 1). The chiropractor had the smallest share (1%) among the 12 providers. Across all countries, 26% of patients visited only one healthcare provider. Two, three, four, five, six or seven providers were visited by 13%, 13%, 12%, 11%, 9% and 6% of individuals, respectively. Less than 5% visited eight or more providers. 34% did not visit any healthcare provider in the last 12 months. More than half of respondent (54%) did not have any inpatient stays in the last 12 months. 19% had one stay, 9% had two and another 9% had three or more stays.

Healthcare utilization cluster characteristics

Nine service utilization clusters were identified with unsupervised cluster analysis (Table 1). Cluster 4 (China) had the lowest service visits across many services, while Cluster 7 (Brazil) featured the highest and most diverse use of services.

Cluster 1 (Australia, South Africa, USA): System with many visits and almost equal reliance on primary and specialized care. General practitioner (GP) services were used slightly more than PRM physician/SCI specialist services. Home workers, chiropractors, or occupational therapists were frequently visited. Inpatient stays were slightly higher than the overall average.

Cluster 2 (Japan, South Korea): System with a strong reliance on SCI specialized outpatient care. Countries with bigger share of visits to a PRM physician/SCI specialist (23%), and to other specialized physicians (14%) than to a GP (9%). Dentists were slightly more visited compared to other clusters (9%), while visits to psychologists were among the lowest (1%). A majority (52%) of patients in this cluster had no inpatient stays.

Cluster 3 (Switzerland, Germany, Lithuania, Norway, The Netherlands): Primary care-oriented system with almost equal use of specialized services. This cluster had the second highest share of GP visits (22%) after Cluster 6 (Indonesia, Poland) (26%). The use of PRM physician/SCI specialist services (9%) was lower than use of GPs (22%), yet other specialist physicians were often visited (12%). Percentage of dentist visits was the highest among all clusters (15%), while the use of nursing services was the lowest (4%).

Cluster 4 (China): System with low healthcare service utilization and reliance mostly on SCI specialized outpatient care, with some consideration of complementary and alternative medicine. This cluster had the largest percentage of those that indicated not visiting any healthcare provider (34%). Similar to

Cluster 2 (Japan, South Korea), this cluster had an almost twice as large share of visits to a SCI specialist (23%) than to a GP (12%). It had low attendance across multiple services: dentist (1%), home healthcare worker (0%), psychologist (0%) and occupational therapist (0%). On the other hand, the share of visits to chiropractor (3%) and alternative medicine specialist (3%) was the largest among all clusters.

Cluster 5 (France, Greece, Italy, Morocco, Spain): System with similar use of primary and specialized services and moderate number of inpatient stays. The patients in these countries had almost equal (18% vs. 16%) shares of visits to GP and PRM specialists. Attendance of occupational therapist is among the lowest (1%) and pharmacist services (13%) was higher than in other clusters.

Cluster 6 (Indonesia, Poland): Primary care-oriented system with infrequent visits. Among the countries in this cluster, the number of persons with no visits to any healthcare provider (10%) was almost three times higher than the average across all clusters. GP services had the highest share across all clusters (26%), along with the nurse or midwife services (12%). Inpatient stays were similar to the overall cluster average.

Cluster 7 (Brazil): Generally specialized system with frequent visits and hospital stays. This cluster had the lowest percentage of persons without any visit to a healthcare provider (0.3%). The share of visits to the PRM physician was high (19%) and visits to a physiotherapist was the highest among all clusters (19%). Persons in this cluster frequently used diverse services such as an occupational therapist, chiropractor, physiotherapist and psychologist. One third of respondents in this cluster had one hospital stay. The cluster had the lowest percentage of three or more hospital stays among all clusters (4%).

Cluster 8 (Malaysia, Thailand): Inpatient-oriented SCI specialized system. In this cluster the share of SCI specialist visits (28%) was twice as large as those to the GP (11%). Hospitalizations were above the cluster average. Alternative medical specialist services were frequently used (5%) while pharmacist services were the least used among all clusters (6%).

Cluster 9 (Romania): Inpatient-oriented care system with highest number of hospitalizations. This cluster had the lowest number of persons without any hospital stay (23%), almost half of the share less than the cluster with second lowest stays (Cluster 8). The percentage of persons with two (28%) and three or more (30%) hospital stays was almost three times higher than the overall cluster average. The percentage of visits to GP, PRM physician/SCI specialist, and physiotherapist was similar (19%, 17% and 17%). Services of pharmacists (13%) and occupational therapists (7%) were frequently utilized.

Socio-demographic characteristics of the healthcare utilization clusters

The highest percentage of males was in Cluster 6 (Indonesia, Poland) (80%) and 7 (Brazil) (79%). Mean age was the lowest in Cluster 9 (Romania) (38 years) and highest in Cluster 3 (Switzerland, Germany, Lithuania, Norway, The Netherlands) (56 years). The percentage of respondents with an immigrant background was below 1% in most clusters, with larger shares in Cluster 1 (Australia, South Africa, USA) (19%), Cluster 3 (Switzerland, Germany, Lithuania, Norway, The Netherlands) (11%), and Cluster 5 (France, Greece, Italy, Morocco, Spain) (6%). The percentage of participants with tetraplegia was highest in Cluster 2 (Japan, South Korea) (42%), followed by Clusters 7 (Brazil) (40%) and 6 (China) (40%). In other clusters this percentage was between 31% and 38%. Cluster 4 (China) and Cluster 7 (Brazil) had the highest percentage of those with incomplete lesion, 75% and 79% respectively. This percentage was lowest in Cluster 2 (Japan, South Korea) (40%). The percentage of those with nontraumatic etiology was highest (32% and 30%) in Cluster 4 (China) and Cluster 7 (Brazil), and lowest in Cluster 2 (Japan, South Korea) (8%).

Experience with healthcare system

The majority of the responders rated their healthcare experience as good or very good across all countries and all four experience categories: respectful treatment 84%; clear explanations 81%; involvement in decision making 77%; satisfaction with healthcare 65%. A small fraction of responders rated their healthcare experience as bad (respectful treatment 3%; clear explanations 4%; involvement in decision making 4%; satisfaction with healthcare 9%) or very bad (respectful treatment 1%; clear explanations 1%; involvement in decision making 2%; satisfaction with healthcare 3%). In terms of overall experience (PREM score (0-100)) by country, the lowest scores were attained by Morocco (44), followed by South Korea (49), Lithuania (55), China (55), Poland (57) and Italy (57). The highest country experience scores were observed in the USA (78), Spain (77), Brazil (74), Australia (73), Malaysia (72) and Switzerland (71). The average experience score across all healthcare utilization clusters was 64 (Table 2). The highest cluster score was 74 in Cluster 7 (Brazil) and the lowest was 52 in Cluster 2 (Japan, South Korea). There was a wide variability of PREM scores within the clusters: the difference among the individual country's experience scores was 33 points between countries in Cluster 5 (France, Greece, Italy, Morocco, Spain), 16 in Cluster 3 (Switzerland, Germany, Lithuania, Norway, The Netherlands), 13 in cluster 1 (Australia, South Africa, USA), 12 in Cluster 2 (Japan, South Korea), 5 in Cluster 6 (Indonesia, Poland), and 3 in Cluster 8 (Malaysia, Thailand).

Utilization type was associated with patient experience (Figure 1). The associations did not significantly differ when unadjusted (with 12 588 observations) or adjusted (with 11 838 observations) for socio-demographic and SCI lesion characteristics. Persons of age 46-60 years and those older than 76 had PREM score higher by 2.2 and 2.3 than those younger than 30 years, while for persons aged 61-75 years this score was 3.9 points higher. Living with tetraplegia was associated with having 1.2 points lower PREM score than living with paraplegia. Those with incomplete lesion had a 1.6 points higher experience score than those with complete lesion. Other characteristics such as sex, migration background, injury etiology, and time since injury showed no association with PREM score (Supplementary Table 1).

Discussion

This study classified 22 healthcare systems from the perspective of individuals with chronic SCI, by quantifying how follow-up healthcare services were actually used. Nine clusters of utilization patterns were identified. These clusters were then associated with the care experience to identify better and worse performing systems in terms of patient experience. While there is a difference in patient experience among the utilization clusters, contradictory to our hypothesis, neither the more primary care oriented nor the specialized care systems led to a uniformly superior patient experience. The specific aspects of

patient experience that this study measured (decision involvement, respectful treatment, clear explanations, satisfaction) seems equally achieved by primary and specialized care alike.

Regarding the healthcare utilization patterns, our finding that persons with chronic spinal cord injury frequently use various follow-up healthcare services across different healthcare settings is supported by the literature.^{15, 4, 16, 17} Although persons with complex health conditions have greater difficulties accessing care in general, including specialized care and rehabilitation,¹⁶ those with high and complex healthcare needs – including persons with SCI – have a higher likelihood of doctor visits.⁴ These findings are particularly evident in certain countries with high frequency of use of different services (e.g., Australia, South Africa, USA (Cluster 1); Brazil (Cluster 7)) and high frequency of inpatient stays (e.g., Malaysia and Thailand (Cluster 8); Romania (Cluster 9)).

As for the association between the utilization cluster and the patient experience, it was found that different utilization patterns led to similar experience. Hence, longitudinal relationship and trust between the healthcare provider and the patient, which is shown to be established in primary care and lead to higher satisfaction,⁶⁻⁸ in persons with SCI might also be equally associated with specialized care. Similarly to the literature, our findings on utilization suggest that often persons with a complex conditions have to use complementary specialist services.¹⁸ Especially the SCI management is often being redirected to specialized care, emergency and inpatient stays.^{15, 19, 20} This could mean that gatekeeping may not be functioning for those with a complex medical conditions, such as SCI.^{21, 22} While the gatekeeping's role of primary care is to assure the right allocation of resources with cost containment and improved health,²¹ it remains unclear if that goal is achieved. Primary care services may not be prepared enough for persons with SCI, while emergency and inpatient stays are not ideal for prevention and follow-up management of preventable conditions.²³

Although it has been established that healthcare in high-income countries is often better performing than in low-income countries,^{10, 16, 24} this view was not supported by our study for persons with chronic SCI. For example, Brazil (Cluster 7) showed the highest patient experience score, while Japan and South Korea (Cluster 2) showed the lowest. Despite healthcare systems generally being viewed as one single structure and equated with the country's boundaries, healthcare may in reality be fragmented and differ geographically and personally.^{23, 25} The difference may also stem from the fact that in this study we focus on one indicator, namely patient experience score, based on interaction with the healthcare provider.

This study focused on the perspective of individuals with SCI from numerous countries with diverse characteristics, including high-, middle- and low-income countries from all WHO regions of the world. Besides its strengths, this study had some limitations. Firstly, the sampling setting and strategy may have affected the identified utilization types. In addition, in certain participating countries, the sampling setting was limited to rehabilitation facilities (Brazil, Germany, Netherland, Norway), acute or general hospitals (China, Spain). This selection may have resulted in more specialized care oriented utilization types.⁹ It remains unclear if certain countries showed higher use of specialized services because of such overall system orientation for the entire population, with specifically persons with SCI in those countries directed to specialists²², or due to our survey sampling setting oriented on specialized care in those countries⁹. The sampling frames in most countries covered only a certain region and do not represent the entire country. Secondly, data collection methods (e.g., interview vs. survey) altered among participating countries⁹, which could have led to a potential bias. Thirdly, we only controlled for the nonmodifiable factors in the regression analysis, while there could be other potential factors influencing patient experience.

Conclusion

While there are distinct patterns between countries on how persons with chronic SCI navigate the healthcare system, neither the more primary care oriented nor the specialized care system leads to a uniformly better patient experience.

Abbreviations

SCI: Spinal Cord Injury; InSCI: International Spinal Cord Injury Survey; LHS-SCI: International Learning Health System for Spinal Cord Injury Study; WHO: World Health Organization; ISPRM: International Society for Physical and Rehabilitation Medicine; ISCoS: International Spinal Cord Society; PREMs: Patient Reported Experience Measures;

PRM: Physical and Rehabilitation Medicine; GP: General Practitioner.

Declarations

Ethics approval and consent to participate

Ethical approval was granted in each participating country based on their regulations. Each study participant signed an informed consent form. The InSCI Study Group approved the present study based on its protocol.

Consent for publication

Not applicable.

Availability of data and materials

The data that support the findings of this study are available from InSCI Study Group but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of InSCI Study Group.

Competing interest

The authors declare no competing interest relevant to this article.

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Authors' contributions

Study conceptualization and development: OB and AG, reviewed and supplemented by PT, JPE, and AH. Methodology: OB and AG, reviewed and supplemented by PT, JPE, and AH. Data analysis and interpretation: OB in supervision by AG. Writing: OB in supervision by AG, reviewed and supplemented by PT, JPE, and AH. All the authors have read and approved the final draft of the manuscript.

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The members of the InSCI Steering Committee are: Julia Patrick Engkasan (ISPRM representative), James Middleton (ISCoS representative; Member Scientific Committee; Australia), Gerold Stucki (Chair Scientific Committee), Mirjam Brach (Representative Coordinating Institute), Jerome Bickenbach (Member Scientific Committee), Christine Fekete (Member Scientific Committee), Christine Thyrian (Representative Study Center), Linamara Battistella (Brazil), Jianan Li (China), Brigitte Perrouin-Verbe (France), Christoph Gutenbrunner (Member Scientific Committee; Germany), Christina-Anastasia Rapti (Greece), Luh Karunia Wahyuni (Indonesia), Mauro Zampolini (Italy), Eiichi Saitoh (Japan), Bum Suk Lee (Korea), Alvydas Juocevicius (Lithuania), Nazirah Hasnan (Malaysia), Abderrazak Hajjioui (Morocco), Marcel W.M. Post (Member Scientific Committee; The Netherlands), Johan K. Stanghelle (Norway), Piotr Tederko (Poland), Daiana Popa (Romania), Conran Joseph (South Africa), Mercè Avellanet (Spain), Michael Baumberger (Switzerland), Apichana Kovindha (Thailand), Reuben Escorpizo (Member Scientific Committee, USA).

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Tables

Table 1. Utilization of Healthcare Services during 12 Months

Table 2. Utilization Clusters Characteristics

Figures

		Clusters										
		1		2		3		4		5		
Total		AU, ZA, US ^a		JP, KR ^a		CH, DE, LT, NL, NO ^a		CN ^a		FR, GR, IT, MA, ES ^a		
	Mean	Min/ Max	Mean	Min/ Max	Mean	Min/ Max	Mean	Min/ Max	Mean	Mean	Min/ Max	
<i>No visits to any provider, %</i>	3.9	0.1/33.6	1.6	0.5/3.1	3.0	0.7/5.3	0.5	0.2/1.0	33.6	2.3	0.1/5.2	
<i>Relative share of provider among all providers, %</i>												
Primary care physician / GP	17.8	8.5/31.4	17.3	16.3/18.8	9.4	8.5/10.3	22.3	17.4/31.4	12.0	17.5	12.2/23.7	
PRM ^b / SCI physician	15.5	7.0/28.2	12.5	8.1/16.5	22.6	17.6/27.6	8.6	7.0/10.1	23.1	16.0	13.4/17.9	
Other specialist physician	11.3	4.0/22.2	8.9	5.6/11.8	14.1	12.3/15.9	12.1	11.5/12.9	4.0	13.4	9.4/22.2	
Nurse of midwife	6.8	1.2/12.5	7.5	5.4/9.5	7.6	3.5/11.7	3.8	1.2/4.6	5.7	7.0	4.7/9.3	
Dentist	8.4	0.6/16.6	8.6	4.8/11.8	9.1	7.6/10.6	14.8	12.9/16.6	0.6	7.5	4.2/9.9	
Physiotherapist	12.9	6.6/19.3	11.3	10.1/12.2	11.8	11.2/12.4	14.1	11.0/16.2	6.6	13.0	10.3/15.2	
Chiropractor	0.7	0.0/2.8	1.5	0.2/2.5	0.7	0.6/0.7	0.6	0.0/1.2	2.8	0.8	0.2/1.2	
Occupational therapist	4.6	0.0/10.5	7.4	5.6/8.8	5.4	4.2/6.6	5.0	3.3/6.7	0.0	1.3	0.9/1.8	
Psychologist	2.8	0.2/10.6	3.1	2.7/3.8	0.7	0.4/1.1	2.6	2.1/3.2	0.2	2.7	1.6/13.7	
Alternative therapist	2.4	0.8/6.6	2.0	1.3/2.6	2.2	1.6/2.9	2.7	1.6/3.3	3.4	1.8	1.0/3.8	
Pharmacist	8.9	0.4/15.0	11.6	9.6/12.6	7.7	7.5/8.0	7.5	1.4/15.0	7.9	13.4	10.2/15.0	
Home health care worker	4.0	0.0/7.8	6.8	6.0/7.5	5.9	5.5/6.3	5.4	2.6/7.8	0.0	3.3	0.6/4.6	
<i>Number of inpatient stays^c, %</i>												
0 stays	53.7	23.2/74.8	54.9	50.1/58.0	51.8	49.0/54.6	55.2	38.8/68.5	65.0	57.9	41.7/74.8	
1 stay	19.3	11.5/33.3	15.5	11.5/19.3	16.7	15.6/17.9	19.5	13.5/26.9	19.0	18.4	13.6/25.2	
2 stays	8.9	4.3/27.8	9.2	6.0/11.8	5.3	4.9/5.6	7.3	4.3/9.7	6.7	8.2	5.8/10.3	
3 and more stays	8.9	0.5/30.1	13.6	10.8/18.0	7.6	6.6/8.7	7.6	2.6/12.5	9.2	5.4	0.5/12.4	

^a AU – Australia, BR – Brazil, CN – China, FR – France, DE – Germany, GR – Greece, ID – Indonesia, IT – Italy, JP – Japan, LT – Lithuania, MY – Malaysia, M, Romania, ZA – South Africa, KR – South Korea, ES – Spain, CH – Switzerland, TH – Thailand, US – USA

^b PRM – physical and rehabilitation medicine

^c Missing values: total: 9.2%, (Cluster) 1: 6.8%, 2: 18.6%, 3: 10.4%, 4: 0.1%, 5: 10.1%, 6: 9.7%, 7: 0%, 8: 10%, 9: 2.2%

<i>Clusters</i>		1	2	3	4	5	6	7	8	9
<i>Countries</i>	Total	AU, ZA, US ^a	JP, KR ^a	CH, DE, LT, NL, NO ^a	CN ^a	FR, GR, IT, MA, ES ^a	ID, PL ^a	BR ^a	MY, TH ^a	RO ^a
<i>PREMs score, 0-100^b</i>	64	72 (AU: 73, SA: 65, US: 78)	52 (JA: 61, SK: 49)	67 (CH: 71, GER:64, LN: 55, NL: 70, NO: 69)	55	62 (FR: 70, GR: 58, IT: 57, MA: 44, SP: 77)	58 (IN: 62, PL: 57)	74	70 (MY: 72, TH: 69)	60
<i>Socio-demographic characteristics</i>										
Male – % (Min, Max)	72.8 (58.1, 83.1)	71.9 (58.1, 74.9)	77.2 (75.6, 82.1)	70.1 (62.8, 71.2)	71.1	72.1 (69.8, 74.3)	80.4 (67.2, 83.1)	79.1	74.9 (70.9, 79.2)	72.2
Age – mean (Min, Max)	51.3 (38.2, 58.6)	54.3 (38.4, 57.5)	49.7 (48.0, 54.8)	55.8 (42.3, 58.6)	49.7	47.8 (38.6, 51.6)	46.3 (43.8, 46.8)	44.2	42.6 (40.1, 45.0)	38.2
Migrant background – % (Min, Max)	7.6 (0.0, 22.8)	19.3 (3.5, 22.8)	0.3 (0.2, 0.3)	10.9 (0.9, 18.4)	0.0	5.8 (0.5, 12.5)	0.6 (0.0, 0.7)	0.0	0.6 (0.3, 1.0)	0.5
Living situation – % (Min, Max)										
Alone	18.3 (4.1, 31.0)	20.9 (6.5, 22.9)	24.8 (15.6, 27.9)	24.7 (12.4, 28.5)	5.3	17.8 (4.4, 31.0)	11.0 (5.0, 12.3)	6.5	4.5 (4.1, 5.0)	10.6
With others	76.8 (65.1, 94.8)	73.1 (63.3, 80.3)	72.3 (69.0, 82.1)	69.4 (65.9, 87.2)	91.9	79.9 (65.1, 94.8)	82.1 (77.6, 83.0)	92.5	88.0 (87.2, 88.8)	88.9
In institution	3.3 (0.0, 27.1)	5.6 (0.5, 27.1)	1.2 (1.0, 1.7)	3.0 (0, 3.4)	2.4	1.4 (0.5, 1.9)	6.0 (3.9, 15.9)	0.0	6.0 (4.7, 7.2)	0.5
<i>SCI characteristics</i>										
Tetraplegia – % (Min, Max)	36.4 (10.0, 49.0)	37.0 (36.7, 38.4)	41.7 (39.3, 49.0)	38.2 (29.8, 46.9)	33.1	31.1 (25.7, 36.0)	39.6 (10.0, 45.7)	40.3	27.5 (25.6, 29.5)	30.6
Incomplete lesion – % (Min, Max)	60.4 (25.2, 79.1)	64.6 (46.7, 71.4)	40.3 (35.8, 41.8)	62.1 (25.2, 79.0)	74.5	55.8 (53.5, 60.7)	54.7 (54.1, 57.7)	79.1	56.8 (54.7, 59.1)	67.1
Nontraumatic etiology – % (Min, Max)	19.0 (0.0, 36.5)	13.8 (0.0, 16.3)	8.3 (7.8, 9.9)	22.0 (6.4, 36.5)	32.3	21.4 (14.0, 29.6)	10.9 (10.7, 11.9)	29.9	14.1 (13.8, 14.4)	16.2
Years lived with SCI – mean (Min, Max)	13.2 (3.3, 20.0)	16.0 (10.3, 17.2)	16.7 (15.6, 20.0)	14.8 (8.4, 19.1)	4.5	13.8 (7.0, 18.1)	13.3 (11.0, 13.8)	3.3	8.7 (8.3, 9.2)	8.2

^a AU – Australia, BR – Brazil, CN – China, FR – France, DE – Germany, GR – Greece, ID – Indonesia, IT – Italy, JP – Japan, LT – Lithuania, MY – Malaysia, MA – Morocco, NL – Netherlands, NO – Norway, PL – Poland, RO – Romania, ZA – South Africa, KR – South Korea, ES –

^b Healthcare experience score obtained after Rasch analysis

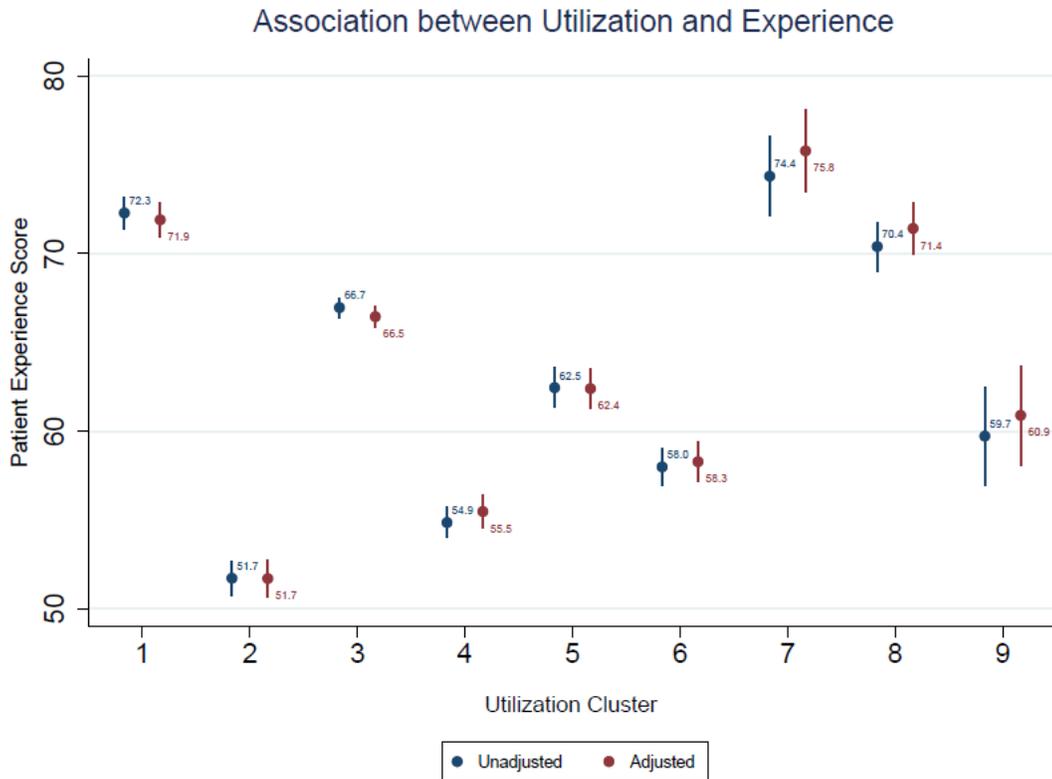


Figure 1

Association between Utilization and Experience Patient experience score range: 0-100. Cluster numbers and countries: 1 – Australia, South Africa, USA; 2 – Japan, South Korea; 3 – Switzerland, Germany, Lithuania, Netherlands, Norway; 4 – China; 5 – France, Greece, Italy, Morocco, Spain; 6 – Indonesia, Poland; 7 – Brazil; 8 – Malaysia, Thailand; 9 – Romania.

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