Profile of patients with spinal cord injuries in Kwazulu-Natal, South Africa: Implicactions for vocational rehabilitation

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Objectives: To describe the demographic and socio-economic profiles, and injury related characteristics of people who sustain SCIs in KZN in order to provide baseline information to instigate a model that guides employment outcomes amongst PLWSCI.
Design: Retrospective analysis of medical files was done.
Setting: King Dinizulu Hospital Spinal Unit (KDHSU), this being the biggest provider of acute care for people who sustain SCI in KwaZulu-Natal and the Eastern Cape Provinces, South Africa was the setting for our study.
Participants: Medical files of individuals who sustained SCI between 2009 and 2012 were perused (n = 1049) were perused and 188 met the inclusion criteria.
Outcome Measures: Key information from the KDHSU patient's files were extracted using a tool developed using literature and the international spinal cord injury core data set.
Results: The average annual incidence rate was 12.3 per 100 000 population. The male to female ratio was 6:4 with the mean age of 36.69 years, ranging from 16-64. Out of those employed (34%), 72% were working fulltime, mostly in the service industry (31%) and 59% were classified as laborers. The majority (61%) of the participants completed high school. The major cause of SCI was non-traumatic (54%) and 66% were classified as incomplete (ASIA). Furthermore, 80% were classified as paraplegia and 19% tetraplegia. The mean LOS was 42.9 days, ranging from 1-764 days, influenced by level of injury, completeness and classification of injury and surgical intervention.
Conclusion: The profile of SCI in KwaZulu-Natal is slightly different when compared to other provinces in South Africa and the rest of Africa. There is a need to use epidemiological information (including factors that influence employment) to develop rehabilitation models to guide employment outcomes amongst people living with spinal cord injuries in KZN.

Keywords: Profile, Socioeconomic, Employment, Spinal cord injury, Rehabilitation

Introduction

Spinal Cord Injuries (SCI), either traumatic (TSCI) or non-traumatic (NTSCI), have a devastating effect on the individual, their family and society at large.[1] Such injuries may cause long-term disability, significantly impacting on the quality of life and survival of affected individuals.[2] In most people with SCI, there is a reduced ability to participate in employment, which can be a considerable financial burden to their families.[3] Employment offers people living with spinal cord injuries (PLWSCI) an opportunity to participate in productive work, achieve social integration and have an improved quality of life.[4–6] The global estimate of employment rates amongst PLWSCI ranges between 21% to 67% due to different definitions of employment and methodological approaches to data collection.[4] However, in South Africa, there is a high proportion of people living with disabilities who are not economically active when compared with able-bodied individuals. The

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majority of these individuals resides in the Eastern Cape and KwaZulu-Natal provinces.

Rehabilitation is an approach that aims at enabling PLWSCI to reach and maintain optimum productive lifestyles (including employment). Vocational rehabilitation is a multidisciplinary rehabilitation strategy aimed at enabling a person living with a disability to secure, retain and advance in suitable employment.[7,8] According to the South African National Rehabilitation Policy, vocational rehabilitation is one of the key interventions identified to improve community integration amongst people living with disabilities. However, these services are limited and are mainly offered in urban settings and in the private sector, making it difficult for the majority of individuals living with disabilities to access them. Therefore, there is need for the development of a multi-disciplinary model to guide employment amongst people living with disabilities (including PLWSCI) in South Africa to improve the quality of their lives. Within this context, the absence of demographic factors (including those that influence employment amongst PLWSCI in KwaZulu-Natal (KZN) Province, South Africa), needs to be explored prior to planning of a model. This information assisted the researchers to identify key un-modifiable factors or characteristics of this cohort that should be taken into consideration when developing a model.[9]

In South Africa, only three studies were identified that describe the profile of PLWSCI. However, they were done elsewhere in the country, each with a different burden of disease and geographical classifications (urban/rural). There is currently insufficient information about the profile of SCI (including its association to HIV/AIDS) in KZN to develop and implement a model that will guide employment amongst PLWSCI. The aim of this study was therefore to describe the demographic and socio-economic profiles, and injury related characteristics of people who sustain SCIs in KZN. The findings contributed to mapping SCI in South Africa, and served as a foundation for the development of a model to guide employment outcomes amongst PLWSCI in the province.

Methods

Study design and setting

A retrospective analysis of the medical files of all patients admitted between 2009 and 2015 at the King Dinizulu Hospital Spinal Unit (KDHSU), this being the biggest provider of acute care (referral centre) of people who sustain spinal cord injuries in KwaZulu-Natal and the Eastern Cape Provinces. This facility is funded by government and provides care for a population of approximately 11 million. The study population comprised of all adults (16 - 65+ years) patients admitted to the KDHSU who sustained SCI (traumatic or non-traumatic) or cord equina lesions that resulted in permanent neurological damage (complete or incomplete) before they were discharged from the unit. The study was given full ethical approval by the Biomedical Research Ethics Committee (BE499/14) of University of KwaZulu-Natal. The KwaZulu-Natal Provincial Department of Health as well as the Medical Management of King Dinizulu Hospital gave permission for the researcher to peruse the medical files.

Data collection tools and process

A data collection tool was developed using the literature[10,11] and the international guidelines on spinal cord injury data collection standards, and consisted of two sections. Section A obtained their demographic (sex, age, marital status, geographical location) and socio-demographic profiles (employment, occupational classification), and Section B recorded their injury related characteristics (nature, severity, extent, causes and the mechanism of spinal cord injuries, surgical interventions and length of stay (LOS) in the hospital unit). The neurological classification and degree of impairment after SCI was assessed by the medical officer on admission, and defined according to the ASIA scale and the International Neurological Classification of Spinal Cord Injury, which were available for all patients admitted to the unit.

Patients with an ASIA of E (no neurological involvement) were not included. The causes and other demographic information were classified according to the International Core data sets.[13–17] Upon discharge from the KDHSU the medical files of each patient are sent to the Records Department for archiving, where they are assigned a computer generated number and are kept in a designated area per ward/unit. The total number of files (1029) were counted for all those discharged from the spinal unit, and in the absence of a systematic archiving procedures all medical files (purposive sampling) were reviewed for eligibility. Of the 1029, 282 met the inclusion criteria, with a further 94 being excluded due to substantial missing information, which results in 188 patient records being included in the study sample. However, some information were missing in the 188 included files and only available information on each variable was reported in this study.

Data analysis

The provincial population projections (2002 to 2015) were used to calculate the incidence and prevalence

rates of SCI in the province.[12] Descriptive statistics of the demographic, socio-economic and injury related characteristics are presented as means, ranges and standard deviations, as the data was normally distributed. Crude annual SCI incidence rates were calculated using the mid-year population estimates for KZN. Only bivariate analysis associations between the continuous/ categorical independent variables (demographic and socio-economic factors) and the dependent variables (injury related characteristics) were calculated using the chi square test. Poisson regression analysis was used to test for associations between the independent and dependent variables. A significance level of 5% ($P < 0.05$) was used, with confidence intervals (CI) of 95%.

Results

Between 2009 and 2015, 1049 patients who sustained a spinal cord injury were referred and admitted to the KDHSU, of which 188 (18.27%) met the inclusion criteria. Between 2009 and 2015, the mean population estimate was 1 521 812, which resulted in an average annual incidence of SCI of 12.3 per 100 000 population. The results are presented in the three categories of demographic, socio-economic and injury related characteristics.

Participant's demographic profile

The demographic details gave an overview of the spinal cord injury patient's age, sex, marital status, population group, geographical location, residential classification and place of discharge as indicated in Table 1.

Age

The mean age of the participants was 36.69 years (SD 12.27), this being 33.11 years (SD 11.85) for those with TSCI and 39.67 years (SD 11.86) for those with NTSCI. There was a significant difference between the mean age of the TSCI and NTSCI patients ($P < 0.001$). The majority of participants were aged between 16-45 years (76%), with the most affected age group being 31-45 years (40%). The most affected age group amongst the TSCI was 16-30 years (50%), and

Table 1 Demographic profile.

	TSCI		NTSCI		Total	
	Demographic Characteristics					
Sex	n = 84	%	n = 101	%	n = 185	%
Male	68	81%	47	47%	115	62%
Female	16	19%	54	53%	70	38%
Age Categories	n = 84		n = 101		n = 185	%
16-30	42	50%	25	25%	67	36%
31-45	28	33%	46	46%	74	40%
46-60	12	14%	25	25%	37	20%
61+	2	2%	5	5%	7	4%
Marital Status	n = 78		n = 86		n = 164	%
Never Married	61	78%	56	65%	117	71%
Married	14	18%	27	31%	41	25%
Divorced	1	1%	0	0%	1	1%
Co-habiting	1	1%	0	0%	1	1%
Widow/er	1	1%	3	3%	4	2%
Population Groups	n = 81	%	n = 95	%	Total = 176	%
Black	72	89%	87	92%	159	90%
White	2	2%	1	1%	3	2%
Indian	7	9%	7	7%	14	8%
Geographical Locations						
Province of origin	n = 79	%	n = 92	%	Total = 171	%
KwaZulu-Natal	68	86%	79	86%	147	86%
Eastern Cape	11	14%	13	14%	24	14%
Residential Classification	n = 69	%	n = 85	%	Total = 154	%
Urban	6	9%	6	7%	12	8%
Peri-urban	36	52%	37	44%	73	47%
Rural	27	39%	42	49%	69	45%
Place of Discharge	n = 70	%	n = 88	%	Total = 158	%
Private Residence	14	20%	22	25%	36	23%
Hospital (Referral)	48	69%	57	65%	105	66%
Nursing Home	0	0%	1	1%	1	1%
Correctional Facility	0	0%	1	1%	1	1%
Homeless	1	1%	0	0%	1	1%
Other (unclassified)	7	10%	7	8%	14	9%

31-45 years (46%) for the NTSCI, this being a significant differences (P = 0.004).

Sex

The majority of the participants were males (62%), with a male to female ratio of 6:4. The majority of those who sustained TSCI were males (81%) and those who sustained NTSCI were female (53%), this being a significance difference (P < 0.001).

Marital status

The majority of participants had never married (71%), with many more participants who sustained NTSCI being married than those who sustained TSCI. However there was no statistical differences between the NTSCI and TSCI (P = 0.138).

Population group

The overwhelming majority of the participants were classified as Black African (90%) followed by Indians (8%). There was no statistical differences regarding the racial component of the TSCI and NTSCI groups (P = 0.727).

Geographical location (residence)

Most of the participants were from KZN (86%), with 14% being referred from the Eastern Cape Province, with no statistical difference between the TSCI and NTSCI (P = 0.962) groups. The majority of the participants were from peri-urban (47%) and rural (45%) areas, with no statistical difference between the TSCI and NTSCI groups (P = 0.648). Most participants (66%) were discharged back to their base hospitals (referring) followed by transfer to a private residence (23%), with no statistical difference between the TSCI and NTSCI patients (P = 0.669).

Participants socio-economic profile

The socio-demographic data provided information on Table 2 to contextualize the patients' living circumstances. The employment status, type of employment, type of industry, type of occupation as well as level of education was explored.

Employment status

The majority (61%) of participants' employment status was recorded, with 34% being employed and 27% being unemployed (Table 2). However, the **employment status** of 39% of the participants was unknown or not indicated in the medical files. There was significant differences on employment status between the TSCI and NTSCI (P = 0.015).

Table 2 Socio-economic characteristics.

	TSCI		NTSCI		Total		P Values
Employment Status	n= 84	%	n = 101	%	n = 185	%	P = 0.015
Yes	33	39%	30	30%	63	34%	
No	14	17%	36	36%	50	27%	
Unknown	37	44%	35	35%	72	39%	
Type of Employment	n = 32	%	n = 29	%	n = 61	%	P = 0.064
Full-time	23		21		44	72%	
Part-time	4		2		6	10%	
Temporary	3		1		4	7%	
Self-Employed	2		5		7	11%	
Type of Industry	n = 27	%	n = 25	%	n = 52	%	P= 0.371
Mining	0	0%	1	4%	1	2%	
Manufacturing	2	7%	2	8%	4	8%	
Construction	5	19%	2	8%	7	13%	
Trade	2	7%	5	20%	7	13%	
Transport	8	30%	4	16%	12	23%	
Services	8	30%	8	32%	16	31%	
Community Services	2	7%	3	12%	5	10%	
Type of Occupation	n = 28	%	n = 26	%	n = 54		P = 0.629
Security officer	2	7%	1	4%	3	6%	
Laborer	17	61%	15	58%	32	59%	
Miner	0	0%	1	4%	1	2%	
Driver	5	18%	4	15%	9	17%	
Professional	4	14%	5	19%	9	17%	
Education	n = 26	%	n = 33	%	n = 59		P = 0.442
Primary	0	0%	3	9%	3	5%	
Secondary	6	23%	7	21%	13	22%	
Matric	16	62%	20	61%	36	61%	
College	1	4%	0	0%	1	2%	
University or Technicon	3	12%	3	9%	6	10%	

Type of employment, industries and occupation

The majority of the employed participants were employed full-time (72%), with the industry most affected being the services industry (31%), with most being employed as laborers (59%). Almost two thirds had **completed high school** (61%), and there was no difference in the education levels between the TSCI and NTSCI groups.

Injury related characteristics

The data on injury related factors consisted of the aetiology, associated injuries, associated medical conditions, neurological classification, level of injury, surgical measurement and length of stay, these being important to establish as they relate to the severity of the patients' condition, which has implications for their employability.

Aetiology

The most common causes of spinal cord injuries in KZN were non-traumatic events, which accounted for 54% of all cases (Table 3). Infective spondylitis (79%) was the major cause of non-traumatic spinal cord injuries followed by neoplasm (16%), whilst motor vehicle accidents (64%) were the major cause of traumatic spinal cord injuries. Non-traumatic causes of spinal cord injuries in this study were significantly associated with retroviral disease (HIV) (P = 0.000). There were no significant differences between males and females on the causes of SCI.

Associated injuries

Only 13% of the participants sustained associated injuries, which were significantly linked with traumatic spinal cord lesions compared to non-traumatic spinal cord lesions (P = 0.000). The most common associated injuries included traumatic brain injuries, injuries to the chest, and fracture/dislocations involving both the upper and lower limbs.

Neurological classification

The majority of the lesions were classified as incomplete (66%), although complete lesions (ASIA A) had an overall high proportion (34%), followed by ASIA D (29%) and ASIA C (24%) (Table 3). However, amongst participants who sustained NTSCI, a higher

Table 3 Injury related characteristics.

	TSCI		NTSCI		TOTAL	
Causes	n	%	n	%		
Sport	1	1%				1%
Violence	7	9%				4%
Transport	51	64%				27%
Falls	16	20%				9%
Other traumatic causes	5	6%				3%
Total	80					43%
Infective Spondylitis			80	79%		43%
Neoplasms			15	15%		8%
Other			6	6%		3%
Unspecified			6	6%		3%
Total			101			54%
Neurological Classification	n = 81	%	n = 97		n = 178	%
ASIA A	37	46%	24	25%	61	34%
ASIA B	5	6%	18	19%	23	13%
ASIA C	23	28%	19	20%	42	24%
ASIA D	16	20%	36	37%	52	29%
Neurological Levels	n = 74	%	n = 90	%	Total = 178	%
Upper Cervical	4	5%	2	2%	6	4%
Lower Cervical	21	28%	3	3%	24	15%
Upper Thoracic	18	24%	9	10%	27	16%
Lower Thoracic	16	22%	39	43%	55	34%
Upper Lumbar	12	16%	18	20%	30	18%
Lower Lumbar	3	4%	17	19%	20	12%
Upper Sacral	0	0%	2	2%	2	1%
Type of surgical intervention	n = 66	%	n = 77	%	n = 143	%
Decompression	10	15,2%	8	10%	18	13%
Spinal fusion	13	19,7%	9	12%	22	15%
Biopsy			7	9%	7	5%
Decompression & spinal fusion	40	60,6%	31	40%	71	50%
Decompression, spinal fusion & biopsy	3	4,5%	21	27%	24	17%
Unspecified			1	1%	1	1%

proportion of the lesions were incomplete (75%) compared to TSCI (54%). There was a significant statistical difference for the neurological classification between NTSCI and TSCI (P = 0.001).

Injury level

The majority of the lesions affected the Thoracic region of the spine (50%), followed by the Lumbar (30%) and cervical regions (19%) (Table 3). NTSCI lesions affected the thoracic (53%) and lumbar (39%) regions of the spine, while TSCI mostly affected the thoracic (46%) and cervical regions (34%). There were statistical differences between the injury levels of the TSCI and NTSCI groups (P = 0.000).

Surgical management

Three quarters of the participants (77%) received surgical interventions, the most common type being a combination of spinal fusion and decompression (49.7%), followed by a combination of spinal fusion, decompression and biopsy. Among participants who were diagnosed with TSCI (60.6%) and NTSCI (40.3%), decompression and spinal fusion was most common, while amongst participants with NTSCI, a combination of decompression, spinal fusion and biopsy was high (27.3%).

Length of stay

The overall mean length of stay (LOS) was 42.9 days (SD 64.2 days), with a median of 26 days (range= 1-764 days). The mean LOS of the TSCI participants was 52.3 days (SD 88.9 days) 35.2 days (SD 30.3 days) for the NTSCI group, with no statistically difference between them (P = 0.72). However, participants who sustained Upper Cervical lesions stayed longest (79.33 days), followed by Lower Thoracic (50.6 days) and Upper Thoracic (43.19 days) lesions.

Table 4 summarizes the Poisson regression analysis conducted to establish the factors (age, sex, neurological level, cause of injury, ASIA classification, retroviral status) that most influenced the length of stay (dependent variable). Sex (β=-0.012, 95% CI:-0.085, 0.061, P = 0.748) and age (β = 0.001 95% CI: -0.001, 0.004, P = 0.328) were excluded, as they were not statistically significant on the first model and a reduced model was done. Individuals who sustained upper cervical lesions (β=0.958 95% CI: 0.550, 1.366, P= 0.000); individuals classified as ASIA-A (β=0.168, 95% CI: 0.077, 0.259, P = 0.000) and B (β= 0.164 95% CI: 0.060, 0.269, P = 0.002), and those who did not received a surgical intervention (β =-0.241 95% CI: -0.367, -0.114, P = 0.000) stayed longer during the acute care phase. Moreover, individuals who sustained SCI due to transport related injuries (β=0.549 95% CI: 0.318, 0.780, P = 0.000)

Table 4 LOS poisson reduced regression Model.

			95% Wald Confidence Interval		Hypothesis Test				95% Wald Confidence Interval for Exp(B)	
	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.	Exp(B)	Lower	Upper
(Intercept)	3.261	0.2025	2.865	3.658	259.374	1	0.000	26.088	17.541	38.799
[Neurological Level = 1]	0.958	0.2082	0.550	1.366	21.162	1	0.000	2.606	1.733	3.918
[Neurological Level = 2]	0.009	0.2080	-0.399	0.417	0.002	1	0.966	1.009	0.671	1.517
[Neurological Level = 3]	0.017	0.2074	-0.389	0.424	0.007	1	0.934	1.017	0.677	1.528
[Neurological Level = 4]	0.049	0.2043	-0.351	0.449	0.058	1	0.810	1.050	0.704	1.567
[Neurological Level = 5]	0.217	0.2029	-0.181	0.615	1.145	1	0.284	1.243	0.835	1.850
[Neurological Level = 6]	-0.280	0.2093	-0.690	0.130	1.787	1	0.181	0.756	0.502	1.139
[Neurological Level = 7]	0[a]							1		
[Classification of injury (ASIA) at admission = 1]	0.168	0.0464	0.077	0.259	13.170	1	0.000	1.183	1.080	1.296
[Classification of injury (ASIA) at admission = 2]	0.164	0.0533	0.060	0.269	9.490	1	0.002	1.179	1.062	1.308
[Classification of injury (ASIA) at admission = 3]	-0.003	0.0505	-0.102	0.096	0.004	1	0.947	0.997	0.903	1.100
[Classification of injury (ASIA) at admission = 4]	0[a]							1		
[Spinal Surgery = 0]	-0.241	0.0647	-0.367	-0.114	13.820	1	0.000	0.786	0.693	0.892
[Spinal Surgery = 1]	0[a]							1		
[TSCIvsNTSCI = 1]	-0.271	0.1158	-0.498	-0.044	5.475	1	0.019	0.763	0.608	0.957
[TSCIvsNTSCI = 2]	0[a]							1		
[Cause of Injury = 2]	0.165	0.1613	-0.151	0.481	1.046	1	0.306	1.179	0.860	1.618
[Cause of Injury = 3]	0.549	0.1177	0.318	0.780	21.763	1	0.000	1.732	1.375	2.181
[Cause of Injury = 4]	1.100	0.1242	0.857	1.344	78.505	1	0.000	3.005	2.356	3.833
[Cause of Injury = 5]	0[a]							1		
[Cause of Injury = 6]	0[a]							1		
[Retroviral Status = 0]	-1.992	0.2954	-2.570	-1.413	45.460	1	0.000	0.136	0.077	0.244
[Retroviral Status = 1]	0.146	0.0385	0.071	0.222	14.443	1	0.000	1.158	1.073	1.248

and falls (β=1.100, 95% CI: 0.857, 1.344, P = 0.000), and those diagnosed with retroviral disease (β=0.146, 95% CI: 0.071, 0.222, P = 0.000) also stayed longer.

Discussion

The aim of the study was to describe the profile of spinal cord injuries in KwaZulu-Natal, South Africa, and the findings being similar to several other studies conducted in Africa and globally.

The average age in our study of 36.69 years (16-64 years) was similar to studies in Africa and elsewhere.[18–24] although some either profiled cervical injuries only and/or thoracic and lumbar injuries only. The majority of participants were aged 16-45 years, and the most affected age group being 31-45 years. These results were not consistent with other studies done in Africa[20,25–29] but similar to those done globally.[30,31] However, the most affected age group amongst participants with TSCI was 16-30 years, these findings being similar to other studies in South Africa.[26,32]

The majority of participants are most likely to actively participate in the open labor market in South Africa. Sustaining a spinal cord injury will therefore limit their opportunities of gainful employment, resulting in reduced ability to provide for their families,[33] thereby increasing poverty and creating a burden on the social services in South Africa. Young age has been associated with positive employment outcomes following SCI while older age (55-64 years) has not had the same opportunities.[34,35]

The male to female ratio was 6:4, with the majority being males, and while males were more dominant among the TSCI participants, the females within NTSCI were many. This difference in sex distribution between NTSCI and TSCI participants can be attributed to the high association of NTSCI with retroviral disease in this study and that females are generally more vulnerable to HIV infection in Sub-Saharan Africa.[36] While positive employment outcomes are associated with being male[35] but rehabilitation interventions aimed at improving employment outcomes in this cohort should not be sex specific, as more females are now entering traditionally male dominated occupations.

The majority (71%) of the participants **were never married**, with little data being available on marital status and its impact on individuals with SCI in Africa and South Africa. SCI is associated with an increased divorce rates in developing and developed countries.[37] Marital longevity amongst PLWSCI is strongly associated with good social integration and employment.[38] Moreover, it has been demonstrated in other countries that individuals with SCI who were single reported a poor quality of life.[39] Poor social integration and unemployment amongst PLWSCI may affect their marital status and their adjustment to their condition, and might also affect their ability to participate in the open labor market, as they lack a strong social and emotional support network.

The majority of the participants in this study were **rural and peri-urban inhabitant of African** origin (Black), as was the case in earlier studies in South Africa,[18,19,26,32,40] this being consistent with the general population distribution of KwaZulu-Natal (KZN)Province and South Africa, where majority of the inhabitants are African. Although there is no empirical evidence to indicate an association between geographical location and employment outcomes amongst PLWSCI, race and ethnicity have been shown to be associated with employment outcomes amongst PLWSCI globally.[41–45] Employment opportunities in rural and peri-urban areas are generally limited, and poor infrastructure and transport services that do not accommodate those with spinal injuries may make accessing employment difficult. In addition, education opportunities in rural areas may put people at a disadvantage of gaining skills that make them employable. Therefore, interventions that are aimed at improving employment outcomes amongst this cohort in South Africa should be racially and geographically sensitive, and appreciate the contextual factors associated with employment for disabled persons in general in peri-urban and rural areas in KZN.

Only 34% of the participants **were employed** before the SCI, which reflects the generally low national employment rates in South Africa, which is currently 25%. However, caution should be exercised when interpreting these results, as employment information was missing in 39% of the medical files perused. Moreover, employment rates upon discharge were not documented, the absence of this information during hospitalization possibly having a negative influence on any rehabilitation interventions that were implemented to improve employment outcomes upon discharge.

Higher education has been demonstrated to have a positive employment outcome amongst PLWSCI,[43,44] with the majority of participants having a school leaving certificate (equivalent to Grade 12). In South Africa, this makes it easier for an individual to access further training or higher education, and makes vocational rehabilitation interventions easier to implement.

Non-traumatic spinal cord injuries (NTSCI) were the most common cause of spinal cord lesions in the study setting, with infective spondylitis being a significant

contributing factor. These findings are not consistent with other studies done in South Africa or elsewhere,[46] which identified violence and motor vehicle accidents as major causes of SCI.[22,25,26,47–49] The differences in these results with African and South African studies may be due to the increased retroviral HIV infection rate in KZN.[50] Further studies should be done with a stronger methodological designs to explore the relationship between SCI and retroviral disease. As there is limited research about the relationship between the causes of SCI and employment, the association between such injuries and retroviral diseases in this study should be explored when planning for vocational rehabilitation interventions. This should include occupational health components related to the management of retroviral disease in an occupational health setting.

The majority of the **SCIs were classified as incomplete** with most participants sustaining lesions in the thoracic region, which is not consistent with studies done in South Africa or other African States.[21,26,28,32,46–49] Individuals whose injuries are classified as incomplete or paraplegic are associated with positive functional gains or outcomes, this not being the case for those who sustain SCI that re classified as complete and tetraplegia. Positive functional gains are associated with more optimistic employment outcomes amongst PLWSCI.[35] Moreover, the literature indicates that there is a negative association between individuals who sustain complete lesions or high lesions (tetraplegia) with employment outcomes in this cohort.[35]

The majority of participants in this study received some form of **surgical intervention,** which ranged from spinal fusion, to decompression and biopsy. The aim of a surgical intervention in people who sustain a SCI is to stabilize the spine and relieve pressure to the cord, thereby reducing further deterioration of neurological function.[51,52] However, in this study, biopsies were also performed, which might be due to the increased number of NTSCI in the study settings, and to further explore their pathogenesis. Although there is no known association between surgical management and employment outcomes amongst PLWSCI, individuals who received surgical interventions in the study setting are expected to have optimal functional outcomes, which are associated with positive employment opportunities.

The majority of individuals in this study were from peri-urban and rural areas, which might affect their ability to access transport and might also affect their work attendance with negative financial consequences. There are laws that protect people with disabilities in the workplace in South Africa[53–55] but the majority of people living with disabilities (including PLWSCI) have little knowledge of their legal rights and limited access to legal assistance.

The **mean LOS** in this study (acute care) was 42.9 days, which is similar to studies done in similar acute care settings in South Africa.[22,47] Participants who sustained higher lesions and or complete lesions stayed longer in hospital as functional gains were slower. Those who sustained TSCI stayed longer than those who sustained NTSCI, which might be due to presence of associated injuries that could delay their overall rehabilitation process. The LOS in an acute setting in South Africa is relatively short, with the management focus being on achieving level 1 to 3 of the rehabilitation outcomes. Thereafter, they are transferred, for further inpatient rehabilitation to sub-acute provincial rehabilitation facility or referring district or regional hospitals. It is expected that vocational rehabilitation interventions in an acute care setting will be minimal. However, in an effort to motivate the affected individuals, non-demanding vocational rehabilitation interventions should be commenced in this setting. Identifying employment status and its factors should be explored, and the initial engagement of the individual to start thinking about such opportunities needs to be initiated in the acute care setting.

Conclusion

This study identified that SCI affects mainly young and economically active individuals who reside in peri-urban and rural areas. Accessibility of the immediate home and community environments should be taken into consideration when planning activities associated with employment amongst PLWSCI. Involvement of the Department of Public Works and the Local Municipality is of paramount importance as structural modifications are necessary to remove barriers associated with physical accessibility. Furthermore, the majority of the affected individuals were unemployed but had advantageous levels of education that could be developed to enhance their employment outcomes. The Departments of Basic and Higher Education in South Africa should be involved in the formulation of activities that will provide PLWSCI with basic skills and education required to participate in the open labor market. The main cause of SCI identified in this study included retroviral disease. This necessitate a holistic approach to the management of PLWSCI in KwaZulu-Natal by introducing occupational health component to the proposed model. This component will include disease management as well as strategies that will prevent further health related complications

related to SCI and HIV in the workplace. Therefore, these factors should be identified in the early stages of rehabilitation (acute care) in order to adequately prepare the affected individual to participate in economic activities as they navigate through the rehabilitation process in KwaZulu-Natal.

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