

Reintegration into Society of Patients with Complete Cervical Spine Injuries in Nigeria

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Abstract

Background: Reintegration into society following complete cervical spinal cord injury (SCI) is a multidimensional challenge, particularly in low-resource settings. This study assessed the level of reintegration among patients with complete cervical SCI in Nigeria and identified predictors of favourable outcomes across medical, functional, environmental, and psychological domains. **Methods:** A cross-sectional study of 87 patients with complete cervical SCI (ASIA A) who were discharged from the National Orthopaedic Hospital Dala, Kano, between January 2020 and December 2024 was conducted. Reintegration was assessed across four domains: (i) medical and physiological (respiratory management, bowel management, pressure ulcer prevention); (ii) functional independence (caregiver training, mobility equipment, environmental control units); (iii) environmental and social support (home accessibility, accessible transport, financial and social resources); and (iv) psychological readiness (mental health, self-efficacy). Multivariate logistic regression identified predictors of favourable reintegration. **Results:** Of 87 patients (55 male, 32 female), all required respiratory and bowel management. Pressure ulcer prevention was achieved in 43 patients (49.4%). Mobility equipment was available to 63 patients (72.4%). Only 3 patients (3.4%) had home accessibility modifications; none had accessible transport or caregiver training. Adequate financial and social resources were reported by 21 patients (24.1%). Mental health was adequate in 33 patients (37.9%), and self-efficacy was present in 12 patients (13.8%). Independent predictors of favourable reintegration included male sex (OR 3.4, 95% CI: 1.2-9.6), younger age (<40 years) (OR 2.8, 95% CI: 1.1-7.1), and adequate financial resources (OR 5.6, 95% CI: 2.1-14.9). **Conclusions:** Reintegration following complete cervical SCI in Nigeria is profoundly inadequate across all domains. Male sex, younger age, and financial resources are significant predictors of favourable outcomes. A comprehensive, multi-sectoral rehabilitation policy is urgently needed.

Keywords: Complete cervical spinal cord injury, community reintegration, functional independence, social support, predictors, Nigeria

Introduction

Traumatic spinal cord injury (SCI) is one of the most devastating conditions a person can sustain, resulting in permanent neurological impairment, loss of independence, and profound socioeconomic consequences [1]. Cervical SCI, in particular, leads to tetraplegia, affecting all four limbs and trunk, and imposes significant challenges in mobility, self-care, respiratory function, and bowel and bladder management [2]. The global incidence of SCI is estimated at 10.4-83 per million population annually, with disproportionately higher rates in low- and middle-income countries [3][4].

In Nigeria, the burden of traumatic SCI is substantial, with road traffic accidents, falls, and violence being the leading causes [5]. A study from Kano reported that cervical SCI accounted for 56.5% of all spinal injuries in a paediatric cohort [6], while another study found that complete SCI (ASIA A) occurs in 61.8-68.8% of patients [7]. Despite the high incidence, Nigeria lacks a National Rehabilitation Policy, and dedicated rehabilitation facilities for SCI are virtually non-existent [8][9]. The Spinal Cord Injuries Association of Nigeria (SCIAN) has repeatedly called for

government action, highlighting that the absence of rehabilitation centres is worsening deaths, depression, and long-term disability among victims [10].

Community reintegration--the process by which individuals with SCI return to and participate in their communities--is a critical outcome of rehabilitation [11]. It encompasses multiple domains: medical management (respiratory care, bowel management, pressure ulcer prevention), functional independence (mobility, self-care, use of assistive devices), environmental and social support (home accessibility, transport, financial resources), and psychological readiness (mental health, self-efficacy) [12]. In high-income countries, structured rehabilitation programmes, assistive technology, and social support systems facilitate reintegration [13]. However, in low-resource settings, these supports are often lacking, leaving patients and families to cope with minimal assistance [14].

A qualitative study from northwest Nigeria found that community reintegration is a multidimensional process requiring a multisectoral approach [15]. People with SCI experience significant challenges when returning to their communities following hospital-based rehabilitation,

particularly in low- and middle-income countries [16]. The bio-psychosocial model for understanding community reintegration varies across communities, and information about community reintegration in Nigeria remains limited [17]. Studies from South Africa and Rwanda have reported poor community reintegration outcomes, highlighting the need for holistic rehabilitation that prepares individuals to return to the community [18][19].

This study aimed to assess the level of reintegration into society among patients with complete cervical SCI in Nigeria and to identify predictors of favourable outcomes across medical, functional, environmental, and psychological domains.

Methodology

Study Design and Setting

This was a cross-sectional study conducted at the National Orthopaedic Hospital Dala, Kano, Nigeria - a 250-bed tertiary orthopaedic referral centre serving northern Nigeria. The study period was 1 January 2020 to 31 June 2025. Ethical approval was obtained from the institutional research ethics committee and informed consent was obtained from all participants.

Participants

All patients aged ≥ 18 years with a diagnosis of complete cervical spinal cord injury (ASIA A) who were discharged from the hospital during the study period and could be contacted for follow-up were eligible. Inclusion criteria: (1) complete cervical SCI (ASIA A) confirmed by clinical examination and MRI; (2) discharged from hospital for at least 6 months; (3) willing to participate. Exclusion: patients with incomplete SCI, thoracic or lumbar injuries, or those lost to follow-up.

A total of 87 patients met the inclusion criteria: 55 male and 32 female.

Data Collection

Data were collected through patient interviews, review of medical records, and home visits where feasible. A structured questionnaire was developed based on the four domains of reintegration:

1. Medical and physiological: Respiratory management (all patients require assistance with breathing, cough, or suctioning), bowel management (all patients require assistance with bowel care), and pressure ulcer prevention (based on patient report and clinical examination).
2. Functional independence: Caregiver training (formal training provided to caregivers), mobility equipment (availability of wheelchair, cushion, etc.), and environmental control units (any assistive technology for home environment).
3. Environmental and social support: Home accessibility (ramps, widened doorways, bathroom modifications), accessible transport (availability of adapted vehicle or accessible public transport), and financial and social

resources (adequate income, family support, community support).

4. Psychological readiness: Mental health (adequate defined as no clinical depression or anxiety requiring treatment), and self-efficacy (patient's belief in their ability to manage daily activities and participate in community life).

Definitions

Favourable reintegration: Defined as achievement of at least 50% of the criteria across all four domains.

Adequate financial resources: Monthly household income sufficient to meet basic needs and medical expenses.

Self-efficacy: Patient-reported confidence in performing daily activities and participating in community life.

Statistical Analysis

Data were analysed using SPSS version 26. Categorical variables are presented as frequencies (%), continuous as mean $\pm$ SD. Univariate analysis compared patients with favourable and unfavorable reintegration using chi-square or Fisher's exact test. Multivariate logistic regression identified independent predictors of favourable reintegration. Variables with $p < 0.10$ in univariate analysis were entered into the model. Adjusted odds ratios (OR) with 95% confidence intervals (CI) were calculated. Statistical significance was set at $p < 0.05$.

Results

Patient Characteristics

A total of 87 patients were included: 55 male (63.2%) and 32 female (36.8%). The mean age was 42.6 ± 15.8 years (range 18-78). The majority were aged 18-40 years (51.7%). Road traffic accidents were the most common mechanism of injury (68.9%), followed by falls (19.5%) and violence (11.5%). The mean time since injury was 28.4 ± 18.6 months. Table 1 presents the baseline characteristics.

Table 1 Baseline Characteristics of 87 Patients with Complete Cervical SCI

Characteristic	Category n (%)
Gender	
Male	55 (63.2)
Female	32 (36.8)
Age (years) Mean $\pm$ SD	42.6 $\pm$ 15.8
18-40 years	45 (51.7)
41-60 years	28 (32.2)
>60 years	14 (16.1)
Mechanism of injury	
Road traffic accident	60 (68.9)
Fall from height	17 (19.5)
Violence/assault	10 (11.5)
Time since injury (months) Mean $\pm$ SD	28.4 $\pm$ 18.6
Educational level	

Characteristic	Category n (%)
None/Primary	38 (43.7)
Secondary	31 (35.6)
Tertiary	18 (20.7)
Employment status	
Employed (pre-injury)	52 (59.8)
Unemployed	35 (40.2)

Reintegration Across Domains

Table 2 presents the reintegration status across the four domains. All patients (100%) required respiratory and bowel management. Pressure ulcer prevention was achieved in 43 patients (49.4%), with a higher proportion among males (54.5%) than females (40.6%).

In the functional independence domain, none of the patients (0%) had caregiver training or environmental control units. Mobility equipment was available to 63 patients (72.4%), with a higher proportion among males (76.4%) than females (65.6%).

In the environmental and social support domain, only 3 patients (3.4%) had home accessibility modifications; all were male. No patient had accessible transport. Adequate financial and social resources were reported by 21 patients (24.1%), with a significantly higher proportion among males (32.7%) than females (9.4%) ($p=0.01$).

In the psychological readiness domain, mental health was adequate in 33 patients (37.9%), with males (49.1%) faring better than females (18.8%) ($p=0.005$). Self-efficacy was present in only 12 patients (13.8%), with males (18.2%) outperforming females (6.3%) ($p=0.10$).

Table 2 Reintegration Status Across Four Domains

Domain	Criteria	Total n (%)	Male n (%)	Female n (%)
Medical and physiological				
	Respiratory management	87 (100)	55 (100)	32 (100)
	Bowel management	87 (100)	55 (100)	32 (100)
	Pressure ulcer prevention	43 (49.4)	30 (54.5)	13 (40.6)
Functional independence				
	Caregiver training	0 (0)	0 (0)	0 (0)
	Mobility equipment	63 (72.4)	42 (76.4)	21 (65.6)
	Environmental control units	0 (0)	0 (0)	0 (0)

Domain	Criteria	Total n (%)	Male n (%)	Female n (%)
Environmental and social support				
	Home accessibility	3 (3.4)	3 (5.5)	0 (0)
	Accessible transport	0 (0)	0 (0)	0 (0)
	Financial and social resources	21 (24.1)	18 (32.7)	3 (9.4)*
Psychological readiness				
	Mental health	33 (37.9)	27 (49.1)	6 (18.8)**
	Self-efficacy	12 (13.8)	10 (18.2)	2 (6.3)

* $p=0.01$; ** $p=0.005$

Predictors of Favourable Reintegration

Table 3 presents the predictors of favourable reintegration. On univariate analysis, male sex ($p=0.006$), age <40 years ($p=0.02$), adequate financial resources ($p=0.001$), and employment ($p=0.03$) were associated with favourable reintegration. Mechanism of injury and educational level were not significant.

Table 3 Univariate Analysis of Factors Associated with Favourable Reintegration

Factor	Favourable (n=28)	Unfavourable (n=59)	p-value
Male sex	23 (82.1)	32 (54.2)	0.006
Age <40 years	19 (67.9)	26 (44.1)	0.02
Adequate financial resources	15 (53.6)	6 (10.2)	0.001
Employed	21 (75.0)	31 (52.5)	0.03
Tertiary education	8 (28.6)	10 (16.9)	0.19
Road traffic accident	18 (64.3)	42 (71.2)	0.52

Multivariate logistic regression (Table 4) identified three independent predictors of favourable reintegration:

Male sex: adjusted OR 3.4 (95% CI: 1.2-9.6), $p=0.02$

Age <40 years: adjusted OR 2.8 (95% CI: 1.1-7.1), $p=0.03$

Adequate financial resources: adjusted OR 5.6 (95% CI: 2.1-14.9), $p=0.001$

Table 4 Multivariate Logistic Regression - Predictors of Favourable Reintegration

Predictor	Adjusted OR	95% CI	p-value
Male sex	3.4	1.2 - 9.6	0.02
Age <40 years	2.8	1.1 - 7.1	0.03

Predictor	Adjusted OR	95% CI	p-value
Adequate financial resources	5.6	2.1 - 14.9	0.001
Employment	2.1	0.8 - 5.5	0.12

Discussion

This study provides a comprehensive assessment of reintegration among patients with complete cervical SCI in Nigeria. The findings reveal profound inadequacies across all domains of reintegration, with particularly striking deficits in functional independence, environmental accessibility, and psychological readiness. These results underscore the urgent need for a national rehabilitation policy and dedicated SCI rehabilitation services in Nigeria.

All patients required respiratory and bowel management, reflecting the complete loss of motor and sensory function below the cervical level. This finding is consistent with the natural history of high cervical SCI, where respiratory compromise and neurogenic bowel are universal [2]. However, pressure ulcer prevention was achieved in only 49.4% of patients, despite pressure ulcers being a preventable complication with appropriate education, equipment, and nursing care [20]. The higher rate among males (54.5%) compared with females (40.6%) may reflect differences in access to care, caregiver support, or socioeconomic status. This finding aligns with a study from South Africa that found women with SCI face additional challenges in community reintegration [21].

The complete absence of caregiver training and environmental control units is alarming. In high-income countries, caregiver training is a standard component of SCI rehabilitation, enabling family members to provide safe and effective care [13]. The lack of such training in our cohort likely contributes to the high burden on families and the increased risk of complications. Similarly, the absence of environmental control units--devices that allow individuals with tetraplegia to control lights, doors, and other home features--reflects the limited availability of assistive technology in Nigeria. Mobility equipment was available to 72.4% of patients, but this figure may overestimate actual use, as many patients reported that their wheelchairs were inadequate or poorly maintained. A study from South Africa found that access to appropriate wheelchairs is a major challenge for individuals with SCI in low-resource settings [18].

The environmental and social support domain showed the most severe deficits. Only 3 patients (3.4%) had home accessibility modifications, and none had accessible transport. This finding is consistent with a qualitative study from northwest Nigeria, which reported that physical and attitudinal barriers are among the challenges hindering participation in activities for SCI survivors [22]. The lack of accessible transport is particularly concerning, as it effectively traps individuals in their homes, preventing

access to healthcare, employment, and social activities [23].

Adequate financial and social resources were reported by only 24.1% of patients, with a striking gender disparity (32.7% males vs 9.4% females). This finding aligns with a study from South Africa which found that female sex is associated with poorer community reintegration [21]. In Nigeria, women with disabilities face additional discrimination and limited economic opportunities, which compounds the challenges of SCI [24]. The strong association between financial resources and favourable reintegration (OR 5.6) underscores the importance of economic empowerment in community reintegration.

Mental health was adequate in only 37.9% of patients, and self-efficacy in only 13.8%. The higher rates among males (49.1% vs 18.8% for mental health) reflect the additional psychosocial burden faced by women with SCI in patriarchal societies. A study from Rwanda similarly reported poor psychosocial reintegration following traumatic SCI [19]. Depression and anxiety are common after SCI and are associated with poorer functional outcomes and reduced community participation [25]. The low rate of self-efficacy--the belief in one's ability to manage daily activities and participate in community life--is particularly concerning, as self-efficacy is a strong predictor of successful reintegration [12].

The three independent predictors--male sex, younger age, and adequate financial resources--are consistent with the literature. A study from Nigeria found that younger age and male sex were associated with better community reintegration [17]. Employment was also found to be a key factor in other studies [24]. The finding that financial resources are the strongest predictor (OR 5.6) highlights the critical role of economic empowerment in facilitating reintegration. Without adequate financial resources, patients cannot afford mobility equipment, home modifications, or ongoing medical care.

A study of 50 individuals with SCI in a Nigerian city reported that community reintegration was associated with clinical and psychosocial attributes [17]. A qualitative study from northwest Nigeria found that community reintegration requires a multisectoral approach [15]. A South African study developed a community reintegration model that addresses reintegration challenges through a structured, multi-level framework [18]. These findings are consistent with our results and underscore the need for comprehensive, multi-sectoral interventions.

This study has several strengths, including a comprehensive assessment across multiple domains of reintegration and the identification of predictors of favourable outcomes. However, there are limitations. The cross-sectional design captures reintegration at a single point in time and cannot assess changes over time. The sample size (n=87) is relatively small, limiting statistical power for subgroup analyses. The study was conducted at a single centre, which may not be representative of all Nigerian settings. The

assessment of reintegration relied on self-report, which may be subject to bias. Finally, the study did not include a control group of patients with incomplete SCI or non-cervical injuries.

Implications for Practice and Policy

The findings of this study have several implications for clinical practice and health policy in Nigeria:

1. National Rehabilitation Policy: Nigeria urgently needs a National Rehabilitation Policy to guide the development of SCI rehabilitation services [8][9].
2. Dedicated SCI Rehabilitation Centres: The government should establish dedicated rehabilitation centres for SCI, as advocated by SCIAN [10].
3. Caregiver Training: Structured caregiver training programmes should be integrated into discharge planning.
4. Assistive Technology: Access to mobility equipment, environmental control units, and home modifications should be improved through government subsidies or insurance coverage.
5. Financial Support: Social protection programmes should include people with disabilities to reduce financial barriers to reintegration.
6. Mental Health Services: Psychological support should be integrated into SCI care to address depression, anxiety, and low self-efficacy.

In conclusion, reintegration following complete cervical SCI in Nigeria is profoundly inadequate across all domains--medical, functional, environmental, and psychological. Male sex, younger age, and adequate financial resources are significant predictors of favourable reintegration. A comprehensive, multi-sectoral rehabilitation policy and dedicated SCI rehabilitation services are urgently needed to address this crisis.

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