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# The association of psychiatric comorbidities with emergency visits and **hospitalisations** in adult sickle-cell patients: a cohort study

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Running head: Psychiatric comorbidities in sickle cell disease

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Psychiatric disorders as a whole are associated with increased health consumption in children **with sickle-cell disease (SCD)** (Myrvik *et al*, 2012, 2013). A systematic review found a modest association between depression and healthcare **utilisation** in children and adult **with SCD** (Jonassaint *et al*, 2016), but the association between psychiatric disorders as a whole and the use of emergency medical services in adult SCD patients is unknown. **Moreover, previous studies were performed in the United States where racial and cultural issues are highly specific. Their results may therefore not extend to other countries.**

We performed a retrospective cohort study in a French centre for adult SCD. Patients followed-up in the centre were included if they had at least one **hospitalisation** through the Emergency Department (ED) between 09/01/2013 and 08/31/2015. Patients were identified and their data were extracted from the administrative and clinical data warehouse of Greater Paris University Hospitals.

SCD patients and psychiatric disorders were retrieved through diagnostic codes (ICD10 codes D570 or D571 and F10 to F48 respectively). An internist (AF) and a psychiatrist **familiar with SCD and cultural specificities of SCD patients** (ND) reviewed the records of all patients with a psychiatric code to ascertain and classify psychiatric disorders. Pain-related anxiety and mood changes during **hospitalisation** were excluded. Psychiatric disorders were classified into 5 subtypes: mood disorders; anxiety disorders; substance-related disorders; psychotic disorders; and others. To assess the adequacy of diagnostic coding to indicate psychiatric disorders, we checked the records of a similar-sized sample of included patients without psychiatric code to look for uncoded psychiatric disorders.

The primary outcome was the **cumulative** duration of emergency visits and **hospitalisations** per year. **Outcomes were compared between patients with psychiatric comorbidities as a whole and patients without psychiatric comorbidity, using generalised linear models with a logarithmic link function. Subgroup analyses were performed for prespecified diagnostic subtypes with at least 10 patients.** All statistical analyses were performed with Stata 15.2 (Statacorp, College Station). Full methods are provided as a Supplementary File.

Three hundred and ninety-two SCD patients met the inclusion criteria and 65 had a psychiatric ICD10 code (Supplementary Figure). After checking their record **review**, 9 of them **had no** psychiatric disorder, 19 had mood disorders, 18 had anxiety disorders, **12 had psychotic disorders, 6 had substance-related disorders, and 1 had an autism spectrum disorder**. The **resulting** positive predictive value of psychiatric codes for the diagnosis of any psychiatric comorbidity was 0.86 [95% confidence interval: 0.76, 0.93]. Records of a sample of 65 patients out of the 327 without psychiatric code were reviewed and 7 **patients** were found to have psychiatric disorders: 3 **had** mood disorders, **2 had opioid-related disorders**, and 2 **had** psychotic disorders. The **resulting** negative predictive value of psychiatric codes for the diagnosis of any psychiatric comorbidity was 0.89 [95% CI: 0.79, 0.95]. From these figures, it can be estimated that the true prevalence of psychiatric comorbidities is 23% [95% CI: 20, 26].

The **cumulative** duration of emergency visits and **hospitalisations** was 14.3 days per patient.year [interquartile range 7.6, 42.4] in the psychiatric disorders group and 5.7 [IQR 2.7, 11.9] in the control group ( $p < 0.001$ , Table 1). **In subgroup analyses**, the difference was **large** for patients with mood disorder (15.8 [IQR 8.5, 59.4],  $p < 0.001$ ) and or anxiety disorder (16.3 [IQR 7.9, 51.1],  $p < 0.001$ ), but less for patients with **psychotic disorder** (9.6 [IQR 5.8, 25.2],  $p = 0.07$ ). This difference was mostly due to the higher number of emergency visits and of emergency **hospitalisations** per patient.year in patients **with psychiatric comorbidities** (Table 1). The mean duration of emergency **hospitalisations** was also **mildly** longer **in patients with psychiatric comorbidities**. The proportion of patients with psychiatric comorbidities increases steadily with the number of emergency visits per year of follow-up (Figure 1).

Our study has several limitations. First, there is a misclassification risk related to the use of diagnostic codes to identify psychiatric disorders. However, a psychiatrist **familiar with SCD and cultural issues excluded wrongly coded psychiatric comorbidities after** systematic record review. **Uncoded psychiatric comorbidities were infrequent and are expected to reduce the magnitude of observed differences (bias toward the null)**. Second, psychiatric assessment may be more often requested for high hospital users and this may induce a detection bias. Finally, our sample only includes patients who were **hospitalised** at least once over the

study period. Our study **could** overestimate the proportion of patients with psychiatric disorders if they are more likely **than those without** to have been **hospitalised** at least once during the study period.

The global emergency care consumption of SCD patients and the ratio of ED consultations followed by **hospitalisation** found here are consistent with previous studies (Paulukonis *et al*, 2016; Brousseau *et al*, 2010; **Carroll *et al*, 2018**). A meta-analysis found a 2.8 relative risk of high hospital **utilisation** in SCD patients with depression (Jonassaint *et al*, 2016). Our study extends this association to other psychiatric disorders. High healthcare **utilisation** and psychiatric disorders may have reciprocal interactions. Longer time spent in the hospital may trigger mood disorders, **and** psychiatric disorders may increase the number or severity of APE due to several mechanisms (psychosomatic interactions, suboptimal somatic care, low treatment adherence...), or decrease pain coping mechanism and lower the threshold for ED visits.

Identification and treatment of modifiable risk factors accounting for high hospital **utilisation are** critical and psychiatric disorders appear to be an important target. **Since reciprocal interactions between disease-related symptoms, healthcare experiences and psychiatric disorders are likely, prompt assessment by a psychiatrist familiar with SCD and cultural specificities of SCD patients is important but should not replace or delay appropriate SCD-specific care. Our results provide evidence to support the allocation of resources to coordinate somatic and psychiatric care of SCD patients.** These measures are likely to improve the quality of life of patients and may reduce emergency visits and **hospitalisations** of those who are high hospital users.

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Fayand A designed the study, reviewed electronic medical records and wrote the paper

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Bachmeyer C critically revised the paper

Mattioni S critically revised the paper

Stankovic-Stojanovic K critically revised the paper

Lionnet F designed the study and critically revised the paper

Steichen O designed the study, **queried the data warehouse, analysed** the data and wrote the paper

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## Tables

Table 1: Patient characteristics and outcomes

	Psychiatric group (n=56)	Control group (n=327)	Unadjusted p-value	Adjusted p-value*
Median age (years)	27 [21, 31]	27 [21, 34]	0.59	-
Female	30 (54%)	186 (57%)	0.66	-
<b>Haemoglobin</b> genotype			0.04	-
- SS	50 (89%)	258 (79%)		
- S $\beta^0$	1 (2%)	3 (1%)		
- SC	3 (5%)	59 (18%)		
- S $\beta^+$	2 (4%)	7 (2%)		
<b>Cumulative</b> duration of emergency visits and <b>hospitalisations</b> per patient.year (days)	14.3 [7.6, 42.4]	5.7 [2.7, 11.9]	< 0.001	< 0.001
Number of emergency visits per patient.year	4.2 [1.5, 7.8]	1.5 [0.8, 3.0]	< 0.001	< 0.001
Proportion of ED visits with subsequent <b>hospitalisation</b> per patient	54% [47%, 75%]	75% [44%, 100%]	0.04	0.04
Number of ED visits without subsequent <b>hospitalisation</b> per patient.year	1.5 [0.5, 3.1]	0.5 [0, 1.0]	< 0.001	< 0.001
Number of ED visits with subsequent <b>hospitalisation</b> per patient.year	2.3 [1.0, 4.5]	1.0 [0.5, 2.0]	< 0.001	< 0.001
Mean duration of emergency <b>hospitalisations</b> per patient (days)	6.7 [5.1, 8.6]	5.3 [3.6, 7.9]	0.007	0.008
Proportion of emergency <b>hospitalisations</b> with a transfer in the ICU per patient	0% [0%, 17%]	0% [0%, 0%]	0.48	0.60

\* adjusted on age, sex and **haemoglobin** genotype (SS/S $\beta^0$  vs SC/S $\beta^+$ )

**Results reported as number (percentage) for categorical outcomes and median [first and third quartiles] for quantitative outcomes**

ED: emergency department; ICU: intensive care unit



## Figures legends

Figure 1: Proportion of sickle cell patients with a psychiatric comorbidity depending on the number of emergency visits per year