

Healthcare resource utilization and costs for multiple sclerosis management in the Campania Region of Italy: comparison between centre-based and local service healthcare delivery

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INTRODUCTION

Multiple sclerosis (MS) treatment and management has benefited from the creation of MS Care Units, based on integrated patient-care (diagnosis, treatment and follow-up), with MS neurologists and nurses working with other specialists within formalized workup protocols and offering a high number of activities to MS patients in a "single stop, single shop" approach. MS Care Units with a centralised multidisciplinary approach are continuously up-to-date with the evolving scenario of MS management, and, as such, can enhance the efficacy of therapy, provide better patient overall satisfaction, and, not least, be cost-effective for the society. However, the latter is difficult to document in the short term and would require socio-economic studies with long-term observation.

OBJECTIVES

1. Evaluate differences in healthcare resource utilization and costs between two MS Centres, each of which being representative of either centralised (i.e., MS Care Unit) or local service-based model of healthcare delivery

2. Evaluate possible associations between costs and MS clinical features.

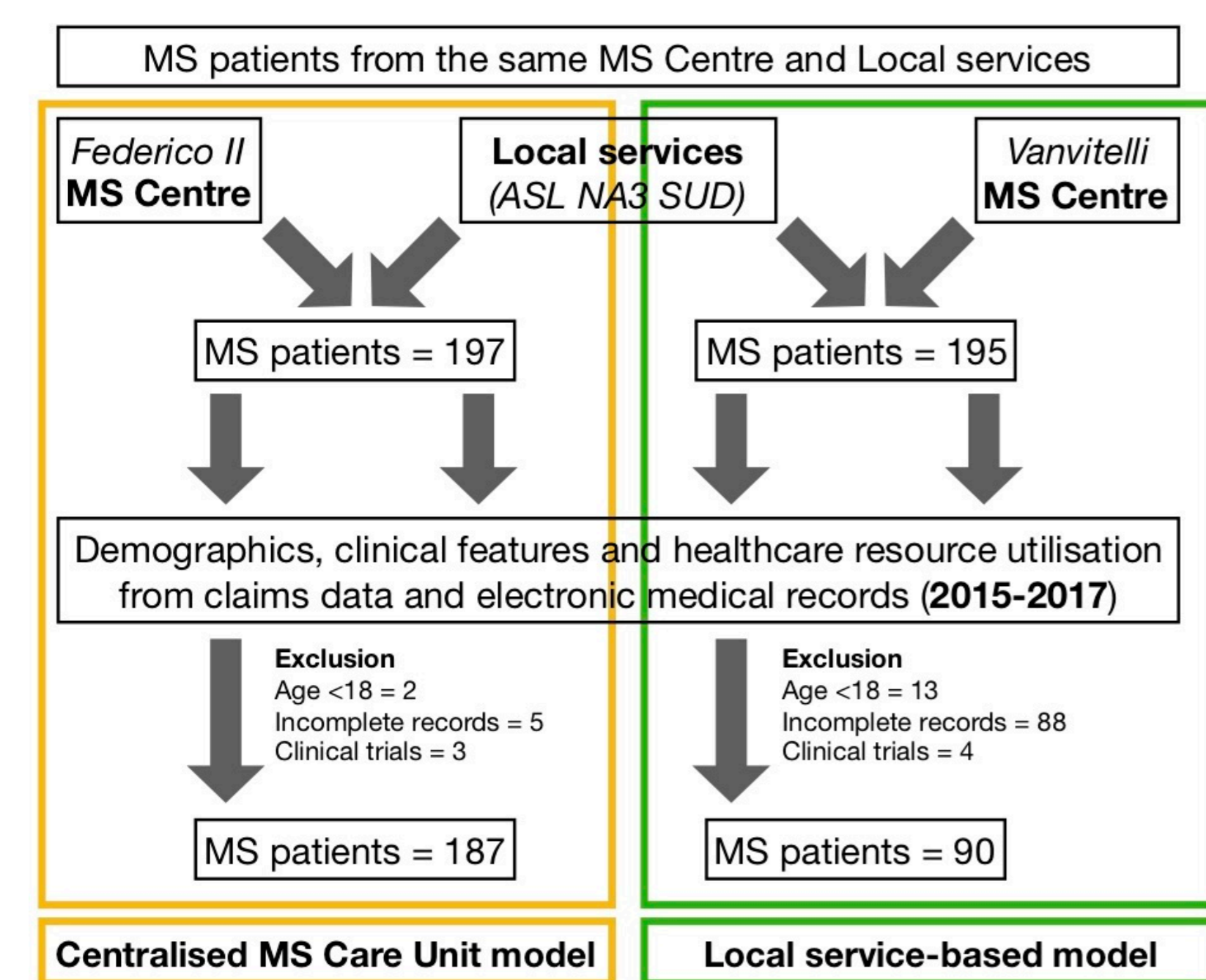
METHODS

Study Design and Population

The present observational cohort study is a retrospective analysis of prospectively collected data (claims data and electronic medical records). Inclusion and exclusion criteria are reported in Figure 1.

ASL NA3 SUD was selected as local healthcare service provider, because it is largely representative of both urban and rural areas, and provides its patients with homogenous services on its reference area. As such, included MS patients from both Federico II and Vanvitelli MS Centres had full access to local ASL NA3 SUD healthcare services.

Figure 1. Figure shows cohort development, with inclusion of MS patients regularly followed-up at the same MS Centre (either Federico II or Vanvitelli University) and local healthcare services (3rd local healthcare agency for the south of Naples (ASL NA3 SUD)). Federico II MS Centre was highly centralised in healthcare delivery, with a MS Care Unit organizational model (yellow), whereas Vanvitelli was based on local services for anything other than neurological consultations and day-service infusion (green).



Healthcare utilizations and costs

DMTs were prescribed in accordance with regulatory indications for clinical practice (Italian and European Medicines Agencies) and the Campania Region Healthcare Regulatory Agency.

Healthcare services for the present study included DMTs, general hospital costs, staff involved in DMT administration, neurological visits, other specialist consultations related to DMT safety or MS clinical features (e.g., ophthalmology, rehabilitation), MRI procedures, laboratory exams, psychological/cognitive evaluations (either diagnostic or therapeutic), performed in accordance with current guidelines and clinical practice. Healthcare costs were inflated to the most recent values (2017). Healthcare costs were then annualized (annual healthcare costs = sum of healthcare costs from the whole study period/years of study).

Medication possession ratio (MPR) was calculated as an indirect measure of adherence (MPR=(medication supply obtained during follow-up period/medication supply expected during follow-up period)*100).

Demographic and clinical variables

Age and sex were recorded. Study duration was calculated from the first (2015) to the last (2017) recorded visit in either MS Centre or local service datasets. The cohort was classified according to: disease subtype (primary progressive (PP), relapsing remitting (RR), or secondary progressive (SP) MS); occurrence of a clinical relapse or not; EDSS progression (1-point progression for baseline EDSS≤5.5, or 0.5-point progression for baseline EDSS≥6.0).

Statistical analyses

Comparisons between the Federico II and the Vanvitelli MS Centre in healthcare resource utilization, adherence and annualized costs (aim 1) were explored by using mixed-effect linear regression models, with a random subject intercept, and using age, sex, baseline EDSS, disease phenotype, study duration and DMT as covariates. Similarly, associations between MS clinical features and annualized costs (aim 2) were explored by using mixed-effect linear regression models, with a random subject intercept, and using age, sex, study duration, disease phenotype, DMT and MS Centre as covariates. Distribution of healthcare costs was preliminarily analysed. Considering that data was right-skewed, cost variables were log-transformed. Results were presented as "percentage difference" (PD) using the following formula Percentage difference = $(e^{\text{Ln(Regression Coeff.)}} - 1) * 100$.

RESULTS

Patients at Vanvitelli MS Centre presented with lower EDSS and shorter follow-up, when compared with Federico II (Table 1).

Federico II and Vanvitelli MS Centres presented with not statistically different DMT utilization during the study period (p=0.076).

Table 1. Demographic and clinical characteristics.

	Federico II (n=187)	Vanvitelli (n=90)	p-values	
Age, years	42.1±10.5	40.9±10.7	0.371	
Sex, female	118 (63.1%)	58 (64.4%)	0.828	
Study duration, years	2.8±0.4	2.7±0.5	0.036*	
Clinical phenotype	PPMS	7 (3.7%)	7 (7.8%)	0.210
	RRMS	160 (85.6%)	70 (77.8%)	
	SPMS	20 (10.7%)	13 (14.4%)	
Baseline EDSS	3.5 (1.5-7.0)	1.5 (1.0-7.0)	<0.001*	
Follow-up EDSS	3.5 (1.5-8.0)	1.5 (1.0-7.0)	<0.001*	
EDSS progression	42 (22.5%)	18 (20.4%)	0.707	
Relapse occurrence	51 (27.3%)	17 (18.9%)	0.129	
Number of relapses	0.379±0.740	0.244±0.605	0.133	

Healthcare resource utilization and costs

Patients at Federico II MS Centre had more consultations within the MS centre, blood tests and psychological/cognitive evaluations (either diagnostic or therapeutic). Patients at Vanvitelli MS Centre had more consultations at local services. Adherence (MPR) was not-significantly lower at Vanvitelli MS Centre (-1.0%), when compared with Federico II (Table 2). Annualized costs for MS treatment and management were 10.6% lower at Vanvitelli MS Centre (absolute annualized cost per patient= 12417.08±8448.32 EUR – around 14000 USD) (adjusted PD=-10.6%; 95%CI=-19.0/-2.7%; p=0.007), when compared with Federico II (absolute annualized cost per patient= 15318.57±10919.59 EUR – around 17000 USD), independently from study covariates (age, sex, baseline EDSS, disease phenotype, study duration and DMT).

Table 2. Healthcare resource utilization and adherence.

	Federico II	Vanvitelli	Coeff	95%CI		p-values
				Lower	Upper	
Consultations within the MS Centre	8.2±2.6	3.0±1.7	-5.732	-6.496	-4.969	<0.001*
Consultations within local services	0.6±1.1	7.0±2.9	6.731	6.048	7.413	<0.001*
Blood tests	10.2±2.6	3.4±1.1	-5.169	-5.980	-4.357	<0.001*
MRI exams	1.5±1.6	0.8±0.6	-0.492	-1.034	0.048	0.075
Psychological/cognitive evaluation	3.6±0.8	3.0±1.9	-0.264	-0.516	-0.012	0.040*
Adherence (MPR)	99.2±0.1%	98.0±0.1%	-1.0%	-2.2%	0.1%	0.060

Costs and clinical features

Across MS centres, annualized total costs were 20.7% higher in RRMS (95%CI=8.9%, 33.8%; p<0.001), and 18.2% higher in SPMS (95%CI=6.6%, 31.1%; p=0.001), when compared with PPMS. Annualized costs were 5.4% higher in patients presenting with a relapse during the study period (95%CI=1.1%, 9.9%; p=0.012), when compared with patients without relapses, and 5.1% higher in patients with EDSS progression (95%CI=0.1%, 10.5%; p=0.047), when compared with patients without EDSS progression. Each point higher baseline EDSS was associated with 1.6% higher annualized costs (adjusted PD=1.6%; 95%CI=0.4%, 2.9%; p=0.006). Aforementioned results were independent from study covariates (age, sex, study duration, disease phenotype, DMT and MS Centre).

CONCLUSIONS

We performed a comprehensive evaluation of MS-related healthcare resource utilization and costs in a selected geographical and healthcare area (ASL NA3 SUD, Naples, Italy). Overall, healthcare resource utilization and costs were lower when most of the healthcare delivery occurred within local services, when compared with centralised delivery in a MS Care Unit organizational model. Healthcare resource utilization and costs were mainly driven by RRMS patients and by more severe disease features (e.g., relapses, disability), requiring higher number of assessments and more expensive DMTs.

The MS Care Unit is the ideal model of multidisciplinary care in MS from neurologists' point of view, but its economic viability remains to be further explored in the long term and in relation to patient preference. A balanced and coordinated integration of local and centralised services should be considered during the formation of MS Care Units. Not least, a specific care should be given to patient more at risk of relapses and disability progression in order to prevent higher costs (and worse disability).

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