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Complexity in palliative care inpatients: Prevalence and relationship with the provision of care—a retrospective study

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Context: End-of-life palliative care aims to provide comprehensive care and can be marked by somatic, psychosocial, and spiritual distresses, requiring interdisciplinary care. However, interdisciplinary care is costly, and palliative care services, similar to all other medical services, are pressurized to be as cost-effective as possible.

Objectives: To describe the case complexity of palliative care inpatients, we evaluated possible correlations between complexity and the provision of care and identified complexity subgroups.

Methods: Patients ($N = 222$) hospitalized in a specialist palliative care unit in Switzerland were assessed for biopsychosocial complexity using INTERMED. Based on a chart review, INTERMED scores were determined at admission and at the end of hospitalization or at death. Descriptive statistics and Pearson's correlation coefficients were used to estimate the association between biopsychosocial complexity and the amount and type of care provided. Principal component analysis (PCA) was conducted to explain variance and identify patient subgroups.

Results: Almost all patients (98.7%) qualified as complex, as indicated by INTERMED. Provision of care was positively correlated ($r = 0.23$, $p = 0.0008$) with INTERMED scores upon admission. The change in the INTERMED score during the stay correlated negatively with the provision of care ($r = -0.27$, $p = 0.0001$). PCA performed with two factors explained 49% of the total variance and identified two subgroups that differed in the INTERMED psychosocial-item scores.

Conclusion: Inpatients receiving specialist palliative care showed the highest complexity score of all populations assessed to date using INTERMED. Correlations between biopsychosocial complexity and care provided, and between care and decrease in complexity scores can be considered indicators of care efficiency. Patient subgroups with specific requirements (psychosocial burden) suggested that palliative care teams require specialist palliative care collaborators.

Key message: Palliative care provision correlates with case complexity and is effective.

Keywords: Intermed, Palliative Care, Case Complexity, Biopsychosocial, Interdisciplinary, Economicity

Introduction

Palliative care, based on the biopsychosocial model of disease¹ and expanded by the spiritual dimension,² aims to provide holistic care.^{3–7} As there exist no possibility of a cure,^{7,8} palliative care patients evolve toward death,^{9,10} often affected by both somatic^{11–15} and psychiatric morbidities,^{16–18} as well as social problems.^{19–22} The vast majority of palliative care patients suffer from cancer,¹⁰ and the therapeutic objective is frequently limited to temporary stabilization of their

condition and symptom relief.²³ End-of-life situations can be marked by somatic, psychosocial,²⁰ and spiritual¹⁶ distresses, often requiring hospitalization and interdisciplinary and interprofessional care.⁷

To the best of our knowledge, only one study using INTERMED to assess biopsychosocial complexity was conducted in a palliative care setting almost 20 years ago. The study included inpatients of a university hospital for whom palliative care consultation was requested,²⁴ demonstrating the biopsychosocial heterogeneity of the sample, and concluded that INTERMED could be a useful tool to comprehensively assess patients' health-care requirements and to tailor interdisciplinary interventions.

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Yet, over the last 20 years, palliative care has evolved and, like any other medical discipline, was pressurized to be utmost cost-effective. A holistic approach to palliative care implies that care is based on an interdisciplinary and interprofessional approach that responds to the patients' needs. However, policymakers and insurance companies have raised a question: Is this expensive approach efficient and really needed?^{25,26} Moreover, there has been a recent narrative review of evidence on the economic value of end-of-life palliative care interventions for greater consistency in reporting outcome measures and costs associated with hospice care.²⁷ Thus, this present study was conducted based on this economic background issues.

The study aim

This study aimed to describe the biopsychosocial complexity of inpatients receiving specialist palliative care. Additionally, the study aimed to determine if a correlation exists between case complexity and the amount of interdisciplinary care provided, and if complex subgroups of patients with different healthcare needs can be identified.

Methods

Setting

The Rive-Neuve specialist palliative care hospice, founded in 1988, is located in the French-speaking Canton of Vaud in Western Switzerland and can accommodate 20 inpatients. The admissions were documented in a file reviewed by a specialist palliative care nurse. Referrals were made by neighboring hospitals or physicians of the mobile palliative home-care team. Indications for hospitalization include palliative care, especially when symptoms are present that are difficult to manage, such as pain, anxiety, or dyspnea. In 2019, 222 patients were admitted; all of them were included in this study because every chart documentation allowed scoring with INTERMED. The study period corresponded to a habitual situation post COVID-19. The staff comprised a multidisciplinary team of nurses, physiotherapists, occupational therapists, art therapists, chaplains, approximately 50 volunteers, physicians, psychologists, psychiatrists, and administrative personnel. The study was approved by the ethics committee of the Canton of Vaud (*CER-VD 2023-01200*) – based on a request for authorization under Article 34 LRH (consent not required) – under the condition that no patient explicitly stated their disagreement for using their routine medical data for research. Because this was a descriptive study, we included the entire year of admission.

Assessment instruments

This study was based on a retrospective review of the medical charts. Sociodemographic and medical data (age and sex) as well as patient symptom assessments using the Edmonton Symptom Assessment System were retrieved from the charts.²⁸

Biopsychosocial complexity was assessed using INTERMED, which is a reliable and valid instrument for evaluating patient case complexity by considering the biopsychosocial situation and the complexity of interactions with the care system.^{29,30} The Appendix presents the 20 items rated by INTERMED. Developed in 1995,³¹ numerous studies have been conducted using INTERMED in different countries, healthcare settings, and patient populations. These studies have consistently reported – for example, in low back pain,^{32,33} chronic shoulder pain,³⁴ diabetes,³⁵ or internal medicine³⁶ – that INTERMED identifies complex patients who have a less favorable response to medical treatments.^{37,38} Moreover, early and targeted psychosocial interventions in complex patients identified using INTERMED have demonstrated beneficial effects regarding medical and psychological outcomes as well as healthcare utilization.^{39,40}

INTERMED can be scored through a semi-structured interview or self-assessment, or retrospectively based on patient charts.⁴¹ In a previous study, the inter-rater reliability of retrospective ratings reached an intraclass correlation of 0.91.⁴¹

INTERMED is composed of three columns for each domain system (biological, psychological, social, and healthcare) (see Figure 1). The first, second, and third columns refer to the past (history), present (current state), and future (prognosis), respectively. Two items in the past and present domains and one item in the future domain were rated, with scores ranging from 0 (no complexity) to 3 (indicating the highest level of complexity). Thus, each domain reached a score of 15, with a total INTERMED score of 60. A score ≥ 21 is considered as indicating biopsychosocial complexity.⁴²

The number of interdisciplinary palliative care interventions – without the care provided by medical doctors and nurses – was documented by routine registration of minutes per patient spent by the different care professionals for 211 of the 222 patients (data were missing for 11 patients). All patients in the Rive-Neuve program were cared for equally by physicians and nurses, as in other medical settings. Therefore, the care minutes calculated in this study relate only to the additional support provided by psychologists, psychiatrists, chaplains, physiotherapists, occupational therapists, dietitians, social workers, hypnotherapy nurses, and others. The time spent with

	History	Current State	Prognosis
Biological	Chronicity (1)	Symptoms severity/Impairment (9)	Complications and life threat (17)
	Diagnostic dilemma (2)	Diagnostic/Therapeutic challenge (10)	
Psychological	Barriers to Coping (3)	Resistance to treatment (11)	Mental health threat (18)
	Psychiatric Dysfunction (4)	Psychiatric symptoms (12)	
Social	Job and Leisure Problems (5)	Residential instability (13)	Social vulnerability (19)
	Social Dysfunction (6)	Poor social support (14)	
Health Care	Access to care (7)	Organization of care (15)	Health system impediments (20)
	Treatment experience (8)	Coordination of care (16)	

Figure 1 INTERMED grid, from Huyse et al. (1997)

patients by volunteers was not collected and was therefore not considered in the calculations.

Statistical analysis

Initially, descriptive statistics for the INTERMED total and domain scores were calculated for admission and end of stay (i.e., death or end of hospitalization).

Table 1 Sociodemographic and administrative data

	N	%
Sex		
Female	112	50.45
Male	110	49.55
Outcome		
Discharged home	62	27.93
Died	160	72.07
Number of stays		
One stay	209	94.14
Two stays	12	5.4
Three stays	1	0.46
	Mean value	[Range]
Age	69	[31–100]
Length of stay (days)	22.4	[1–115]

Differences between independent and dependent groups were analyzed using t-tests. Percentages were calculated to estimate the prevalence of complex healthcare necessities. Correlations between INTERMED change scores calculated using INTERMED T2-T1 and the amount of palliative care provision was estimated by calculating Pearson's correlation coefficients. Correlation coefficients of < 0.20 were considered as small, between 0.20–0.30 as medium, and > 0.30 as large.⁴³ Hierarchical cluster analysis was conducted to investigate whether the sample consisted of distinct sub-groups. It was worked out thoroughly using several criteria to check for the existence of more than one main cluster. However, cluster analysis, a relatively rough method for determining clusters, does not result in easily separable groups. To further investigate the main sources of variance regarding the INTERMED items, principal component analysis (PCA) was conducted. Results identified two factors with an eigenvalue > 1, with one main factor (1) explaining 35.5% and the second factor (2) explaining

13.5% of the variance. Factor loadings were calculated for all 20 items in INTERMED. Items with a high positive factor loading on Factor 1 were related to psychological or social healthcare needs (see Appendix). *P*-values < 0.05 were considered statistically significant.

Results

All charts were used to score the INTERMED items at admission and discharge (*N* = 62) or at death (*N* = 160).

Sociodemographic and administrative data

Table 1 presents participants' sociodemographic and administrative data.

Patients' case complexity

The mean INTERMED scores at admission were 31 (standard deviation [SD]: 5; range: 19–46) at discharge and 31 (SD: 5; range: 13–43) at death. The INTERMED scores at admission did not differ significantly between the discharged patients and those who died ($t(220) = -1.13$; $p = 0.26$). Nearly all patients ($n = 219$, 98.7%) had an INTERMED score ≥ 21 and thus qualified as complex.

Regarding the INTERMED domain scores (biological, psychological, social, and healthcare), 42.5% of the total score was due to the biological, 23% due to the social, 19% due to the psychological, and 15.5% due to the healthcare domains.

Provided health care

Of the 222 patients, 11 had missing data and 4 stayed for such a short span that they could not receive specific palliative care – as there were no therapists on weekends apart from the nurses and the physicians on duty – which reduced the sample regarding care interventions to 207 patients. Information regarding additional care for patients (i.e., number of patients) and the amount of care per patient (i.e., in minutes) is provided in Table 2. 'Interviews (staff)' were related to the time taken by nurses during their

Table 2 Number of patients benefiting from additional care and amount of care per patient

Interventions	Number of Patients	Average Duration (in minutes)	Duration Range (in minutes)
Total care	207	388	5–2876
Psychotherapists	201	152	5–1111
Physiotherapists	136	169	5–905
Chaplains	153	65	5–735
Interviews (staff)	186	44	5–425
Dietitians	132	47	5–245
Social workers	17	89	10–315
Nurse hypnosis	3	145	60–195
Others	17	23	5–75

working hours to speak with patients who wished to talk specifically.

The amount of care provided correlated significantly with the total INTERMED score at admission ($r = 0.23$, $p = 0.0008$), and patients with higher biopsychosocial complexity received more interdisciplinary care. The change in the INTERMED score during the stay correlated negatively with the provision of care ($r = -0.27$, $p = 0.0001$).

Identification of subgroups

The PCA revealed two factors, with one main factor explaining the high amount of variance. For all patients, an individual score for this main factor 1 was computed resulting in either a score ≤ 0 or > 0 . Subsequently, the patients were divided in two subgroups according to this score: patients of subgroup 1 ($n = 121$) were related to a factor 1 score > 0 (red points, see Figure 2), whereas patients of subgroup 2 ($n = 101$) had a factor score ≤ 0 (blue points, see Figure 2). According to the factor loadings, patients with a score > 0 should be psychosocially more burdened compared to patients with a score ≤ 0 .

Figure 2 presents the mean values of the two subgroups for each INTERMED item. The mean values were similar in the two subgroups regarding items 1, 2, 7, 9, 13, 15, 16, and 17. However, regarding items 3, 4, 6, 12, and 18, subgroup 2 demonstrated consistent lower mean values than subgroup 1. All of these items reflect the past, current, or future psychological or social complexities of patients. Thus, subgroup 1 could be described as highly complex with a heavy psychosocial burden, whereas subgroup 2 as highly complex in terms of biological (somatic) aspects and less psychosocially burdened. The total amount of interdisciplinary care received differed significantly between the two groups (subgroup 1: mean = 452.6, SD = 463.8; subgroup 2: 293.6, SD = 277.5; $t_{209} = 2.94$; $p < 0.0001$). Particularly, the amount of additional psychiatric and social care received was significantly higher in subgroup 1 than in subgroup 2 (psychiatric care: mean = 181.1 (205.2) vs. 101.8 (121.6), $t_{209} = 3.32$, $p < 0.0001$; social care: mean = 48.9 (65.9) vs. 27.0 (25.8), $t_{209} = 3.06$; $p < 0.0001$).

Discussion

We initially discuss the results and situate our study within the literature on the economic aspects of palliative care. Although patient populations may differ between palliative care inpatient units, the mortality rate in our study population was similar to that in other palliative care inpatient units.⁴⁴ Regarding the prevalence of case complexity, almost all patients had an INTERMED score above 21, which was three times higher than the prevalence found in

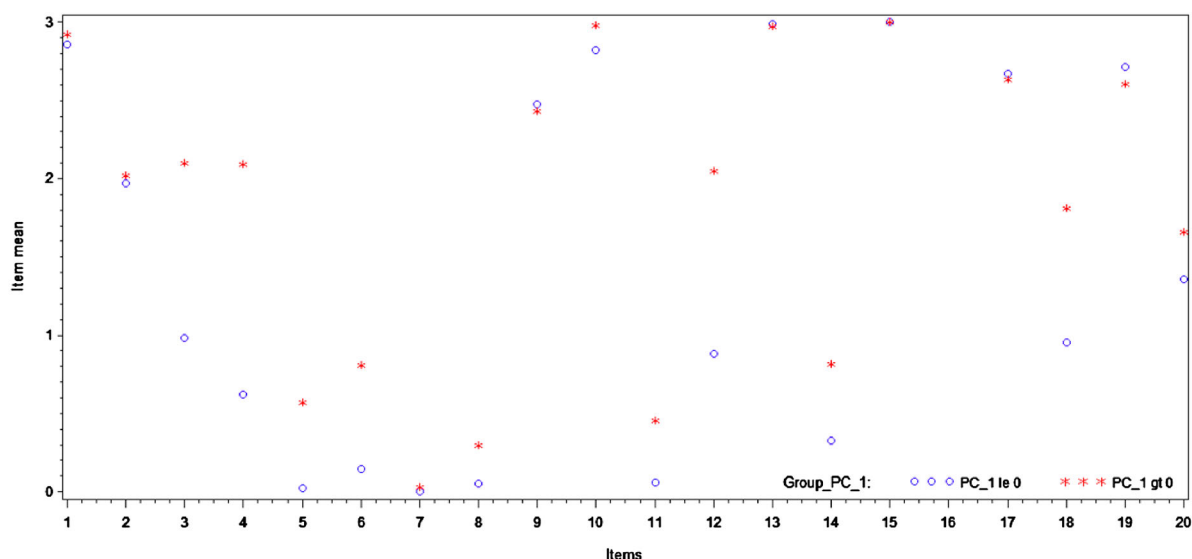


Figure 2 Principal component analysis (PCA) with one main factor explaining a high amount of variance

patients with chronic diseases.^{38,41} This population's extraordinarily high biopsychosocial complexity, which remained stable over the course of the hospital stay, justified the necessity for interdisciplinary care and associated human resources. There was no significant difference in complexity scores at admission between patients who were discharged and those who died, which indicates that care cannot be guided by means of INTERMED or targeted upon admission, as suggested in the first study's discussion using INTERMED in a population referred for palliative care consultations.²⁴ Regarding specific domains of complexity, the somatic symptom burden (biological domain) unsurprisingly contributed the most to the total case complexity. However, the contributions of the social and psychological complexity domains were equal to that of the biological domain, which again demonstrates the requirement for interdisciplinary care considering the psychosocial suffering of patients in need of palliative care. Moreover, there was a medium correlation between INTERMED and the amount of care provided, which increased with patient complexity. Finally, changes in the INTERMED scores showed a significant medium correlation with the care provided. Thus, care reduced healthcare needs during the stay, demonstrating that interdisciplinary interventions are efficient.

Our first approach to identifying different patient groups by means of cluster analysis did not lead to a statistically good fit of cluster results. Only when applying the more sophisticated PCA were two factors identified, with one main factor explaining a high amount of variance and the two subgroups differing markedly in the amount of psychosocial burden. The finding that the heavily burdened psychosocial subgroup received significantly more

psychosocial care underlines the need for an interdisciplinary team of specialists, such as psychiatrists, psychologists, social workers, chaplains, physiotherapists, and occupational and art therapists.

Our study is situated within the body of research investigating the economic aspects of palliative care. A recent study showed that palliative care interventions at the end of life reduce healthcare costs, mostly when home-based; however, hospice-based interventions significantly reduce costs.²⁷ Another study attempted to quantify these costs;²⁵ the greatest savings were achieved when a palliative care program was implemented for inpatients. Therefore, we believe that our study contributes in that it shows that palliative inpatient care cannot only reduce costs but may also a cost-effective way to reduce costs.

Our study has the following limitations. The study is retrospective, which limited the number of assessed variables. First, time investment of professionals depends also on contextual factors such as workload or institutional constraints, and interactional dimensions such as avoidance of so-called difficult patients or the relationship established with the patients. Second, time investment is self-reported, meaning it does not necessarily correspond to patient needs or quality of care, and does not reflect financial investment. Third, the INTERMED as complexity measure – although having demonstrated its validity and reliability to detect complex patients – was not compared to other instruments with the same or similar aims. And fourth, a general call for a systematic INTERMED assessment based on this study in a specific setting is not possible.

This leads us to formulate some thoughts regarding future studies. Studies evaluating case complexity in the palliative care setting and its relationship to the provision of specialized care should be prospectively

conducted. They should comprehensively include variables, which are known to impact on delivered care, and they should also enlarge outcomes by assessing also patient needs from their own perspective, quality of care and costs associated with interventions. We believe, however, that such studies are needed in a context of financial pressure, and that they could contribute to demonstrate the need and efficacy of interdisciplinary care for complex palliative care patients and thus help to obtain the necessary resources for the care of this most vulnerable patient population.

Conclusion

At a time of increasing financial pressure on the healthcare system, which does not spare palliative care, this study determines the extremely high prevalence of case complexity in palliative care inpatients and justifies the interdisciplinary care approach. The effectiveness of care interventions in this setting provides additional evidence for the necessity for human resources for the most vulnerable population, which deserves the attention of medicine and society.

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Disclaimer statements

Ethics approval and consent to participate: The study was approved on August 24, 2023, by the ethics committee of the Canton of Vaud (*CER-VD 2023-01200*) – based on a request for authorization under Article 34 LRH (consent not required) – under the condition that no patient had explicitly stated their disagreement for using their routine medical data for research.

Consent for publication: Not applicable.

Availability of data and materials: Data supporting the study findings are available from the corresponding author (KS) upon reasonable request.

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Author contributions: KS wrote the manuscript and collected the data. FS was the thesis director and was accompanied by KS throughout the entire study process (from design to submission of the manuscript). YC trained KS using INTERMED, discussed the design methodology, supervised chart review, and reviewed the manuscript. BW and DS analyzed the data, summarized the statistics, corrected the methodology and results, and reviewed the manuscript.

Supplemental data

Supplemental data for this article can be accessed online at <https://doi.org/10.1080/09699260.2024.2391626>.

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