


Continuity of Care in Swiss Cancer Patients Using Claims Data

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Background: Continuity of care is positively associated with beneficial patient outcomes. Data on the level of continuity of care in the ambulatory setting in Switzerland are lacking.

Aim: The aim of this study was to evaluate continuity of care in Swiss cancer patients based on routine data of mandatory health insurance using four established continuity scales.

Methods: Retrospective analysis of Swiss claims data (N=23'515 patients with incident use of antineoplastics). The Usual Provider Continuity score, the Modified Continuity Index, the Continuity of Care index, and the Sequential Continuity Index were analyzed based on consultations with general practitioners (GPs), physician specialists and ambulatory hospital wards.

Results: Using information of health insurance claims, the number of consultations and the general level of continuity of care in Swiss cancer patients are high. Continuity of care scores were significantly associated with sociodemographic and regional factors. When focusing on consultations with GPs only, all four scores consistently showed high values indicating high levels of continuity. Continuity with general practitioners was associated with lower costs and lower risks for hospitalization and death.

Conclusion: This is the first study giving insight into continuity of care in Swiss cancer patients. The present study shows that continuity of care is measurable using health insurance claims data. It indicates that continuity with general practitioners is associated with a beneficial outcome.

Keywords: continuity, cancer, health insurance, claims data, care, scale

Introduction

Indisputably, continuity of care is a key aspect of quality of care. It has been shown to be associated with beneficial outcomes such as mortality, healthcare utilization, preventive care utilization, care quality, patient satisfaction, and adherence.¹

The beneficial effects of continuity of care seem to vary with increasing medical complexity.² Cancer is a classic example of a very complex disease characterized by varying clinical features and treatment phases. Diagnosis and treatment of cancer require multidisciplinary collaboration across the interface of health-care sectors.³ Transitions between hospital and ambulatory care are the most vulnerable parts of the delivery of high quality and safe care, especially in fragmented health-care structures such as present in Switzerland.⁴ Continuity of care is therefore considered a marker of quality of care in cancer patients.⁵ Cancer patients regularly necessitate treatment from several providers, including surgeons, oncologists, primary care physicians, nutritionists, psychologists and social workers, who are often located in different settings. This may result in fragmented and uncoordinated care.⁶

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Continuity of care is therefore a major concern of cancer patients and their relatives.⁷

Several instruments for the measurement of continuity of care have been developed⁸ and can be calculated based on claims data.^{9,10} It has been previously postulated that studies and quality initiatives seeking to evaluate continuity of care should make use of administratively derived measures whenever possible,¹¹ or that patient-reported results should be used in tandem with administratively derived values.³ Switzerland has a system of mandatory health insurance covering a broad catalogue of health services for diagnosis and treatment of medical problems.¹² Claims data of Swiss mandatory basic health insurance provide therefore an excellent opportunity to construct, use, and evaluate established continuity measures.

Based on a large sample of cancer patients, the present study evaluates continuity of care using four established continuity scales. It depicts consultation patterns in Swiss cancer patients and investigates continuity of care in Swiss cancer patients across patient subgroups and regions. In addition, it explores the association of different measures of continuity of care with health services' utilization, costs, and death. In contrast to previous research, the present study differentiates the type of healthcare provider, ie, consultations with general practitioners, specialist physicians, and ambulatory hospital wards. Adverse effects of lack of continuity of care might be principally avoidable by better continuity of care. However, valid data is a prerequisite for quality improvement programs.

Methods

Study Design

Retrospective analysis of claims data from the Helsana health insurance group, Zürich, Switzerland. Helsana is one of the largest health insurances in Switzerland covering about 1.2 million mandatory insured persons (about 14% of the Swiss population). The patient-level linked database includes longitudinal information on sociodemographics, health insurance status, prescribed drugs, health-care utilization and its associated costs and the date of death.

Data and Study Population

Patient characteristics included age, sex, regional variables (language area, region of Switzerland, urbanity), and the type of health insurance plan. The health insurance plan was characterized by the choice of a managed care model

and the chosen deductible class. Swiss residents are free to annually choose their basic mandatory health insurance. Premium reductions are available for those who accept restrictions in the free choice of service providers and select a so-called managed care model. Those models include health plans with capitation (joint budget responsibility of primary care physician and health insurance), family doctor models (gatekeeping by selected primary care physician), or telemedicine models (gatekeeping by telemedicine center). Deductibles are obligatory for all Swiss residents and range from 300 to 2500 Swiss Francs (CHF) per year. The standard deductible is 300 CHF, but the insured persons can choose higher deductibles in exchange for reduced premiums. For the analysis, we defined the lowest two levels of deductibles (300 and 500 CHF) as "low deductible" and deductibles from 1000 to 2500 CHF as "high deductibles". These data are highly reliable because the collected insurance claims cover almost all health-care invoices. All geographic information was defined based on the zip codes of residence of the insured person. Level of urbanity (urban, intermediate, rural) was defined using information of the Federal Office of Statistics.¹³ General practitioners, specialists and ambulatory hospital wards are allocated in all parts of Switzerland and all groups are involved in care for cancer patients.

We performed a cohort study of Helsana enrollees aged older than 18 years with basic obligatory health insurance at the Helsana Group between 2014 and 2017. We selected all persons with an incident prescription of an antineoplastic agent (Anatomical Therapeutic Chemical Classification code L01), ie, they had no prior use in the preceding 12 months.

Measures of Continuity

Based on the available literature, we selected four indices constructible on routine data that are internationally established, validated, have been shown to be associated with patient outcomes, and reflect different aspects of continuity of care.^{4,14–17}

- The Usual Provider Continuity index (UPC)^{4,20} This index describes the proportion of visits to the patient's regular physician out of all visits. It ranges from 0 (no visit to the regular physician) to 1 (all visits made to the regular physician). If no regular physician is defined for a patient, the index is computed for the physician the patient visited most

frequently.¹⁸ This index focuses on the dispersion between providers and is based on the number of caretakers and number of visits only. Index values range from 0 (each visit made to a different physician) to 1 (all visits made to a single physician).

- Modified Modified Continuity Index (MMCI). This index focuses on the dispersion between providers and is based on the number of caretakers and number of visits only. Index values range from 0 (each visit made to a different physician) to 1 (all visits made to a single physician).^{4,19}
- The Continuity of Care index (COC).^{2,20} This index weights both the frequency of visits to each caretaker and the dispersion of visits between caretakers. Index values range from 0 (each visit made to a different physician) to 1 (all visits made to a single physician).
- The Sequential Continuity index (SECON).^{4,20} This index measures the number of visits made to the caretaker whom the patient saw in the most recent visit. This index is useful for assessing the need to share information among caretakers. Index values range from 0 (every visit made to a physician other than the physician seen in the previous visit) to 1 (all visits made to a single physician).

A consultation was defined as presence of a consultation tariff code based on the national tariff system for ambulatory services in Switzerland Tarmed. Only tariff codes related to face-to-face encounters were considered as indicators for consultations. Tariff codes are invoiced by either a GP, a specialist or an ambulatory hospital ward, so that consultations were assigned to the corresponding group of service providers.

Statistical Analyses

In a first step, we performed descriptive analyses of the study sample. Incident antineoplastic drug treatment is a proxy for an intensive treatment phase of a malignancy. We aimed to focus the present study on the “chronic” care period of patients with cancer, and therefore plotted consultations over time, stratified by consultations with general practitioners (GPs), specialists and ambulatory hospital wards to identify the average end of the intensive incident treatment phase with antineoplastics. Secondly, we calculated score values and did descriptive statistics (median, mean, inter-quartile range, standard deviation, number of patients with continuity score equal zero and equal one, respectively, number of patients with no consultation to a physician at all

during a given period). In order to enable aggregate measurements and to facilitate benchmarking of continuity of care, we derived a composite measure of continuity by adding the score values of the four scales and dividing by four (COMP). In a third step, we calculated median scores stratified by patient characteristics and tested for differences between groups using Kruskal–Wallis rank-sum test. Fourthly, we calculated the correlation between the four continuity of care indices and the composite measure and healthcare services utilization and death were calculated using Spearman’s rank correlation coefficient or the Mann–Whitney test for median comparison, respectively. To evaluate the relationship between continuity of care as measures using the four different scales (and the composite measure) and the outcome costs, death, and hospitalization, multivariate regression analyses were performed with death/hospitalization in the months 19–30 as outcome variables and the continuity scores as measured in the months 6–18 after incidence and age, sex, number of household members, language region, urbanity, height of annual deductible, health plan, number of chronic conditions, and reason for leaving health insurance as independent variables. For multivariate analyses, quartiles of scores were calculated and a dichotomous variable (person with continuity score value in highest quartile) was built and included in multivariable models. These analyses were done in a subset of patients with incidence in 2014 or 2015 so that we were able to observe 30-month follow-up after incidence. Patient characteristics were assessed at the time of incidence. For costs, linear regression analyses were done accordingly. To avoid collinearity, for each score (N=5) and for each outcome (N=3), a separate model was calculated. This resulted in a total of 60 regression models. Four different versions of scores were calculated for consultations with GPs, with ambulatory hospital wards, for specialist, and for all consultations irrespective of the type of healthcare provider. Analyses were done for all four score versions. From step 2 onwards we only included persons with incident use of antineoplastics in 2014 or 2015 so that we were able to observe the follow-up period. Statistical significance was determined at the 0.05 level. All analyses were done using the statistical program “R”.

Results

Description of the Study Population

A total of 23,515 persons were included in the analytic study sample. They had a median age of 70 years. About half of them were male and were enrolled in the standard

insurance model. The majority chose a low annual deductible and suffered from two or more chronic comorbidities. Persons came from all parts of Switzerland with the majority being from the German-speaking part and from rural areas (Table 1). Health service utilization was high with an annual median of seven consultations with GPs, eight with specialists, and eight with ambulatory hospital wards. Of the total study population, 12'169 persons had incident use of antineoplastics in 2014 or 2015.

Distribution of Consultations Over Time

We plotted the number of consultations per patient over time (Figure 1) and observed that in the first 6 months after incident treatment with antineoplastics, patients had very intensive contacts with ambulatory hospital wards and specialists. The number of consultations with GP was relatively stable with about 0.15 consultations per week over the complete observation period. We therefore decided to focus on the period between 6 and 18 months after incidence for calculation of continuity scores as the incident treatment phase with antineoplastics is not representative for the long-term care phase of cancer patients.

Description of Scores

Continuity scores differed depending on the type of score used for calculation. MMCI score values were consistently higher than the other three scores and close to the maximum value of 1 indicating low discrimination in a population of patients with high service utilization. Continuity scores differed also markedly depending on whether we distinguished the type of healthcare provider. When focusing on consultations with GPs only, all four scores consistently showed high values indicating high levels of continuity. For both, consultations with specialists and ambulatory hospital consultations, the COC as opposed to the other three scales indicated lower values (Table 2).

Median Score Values by Patient Characteristics

Table 3 depicts the correlation between patient characteristics and continuity score values. Interestingly, the scores correlate differently with sociodemographics, health insurance variables, and regional factors. And these correlations vary according to the type of healthcare provider. When focusing on consultations with GPs, we do not detect relevant differences in correlations between patient

Table 1 Characteristics of the Study Population

Characteristics	Incident Case N (%) or Median (IQR)
N	23,515
Sociodemographics	
Age in years	70.0 (19.0)
Age category (years)	
19–49	11,999 (51.0%)
50–69	2,979 (12.7%)
>69	8,537 (36.3%)
Male sex	12,273 (52.2%)
Died during study period	4,368 (18.6%)
Low deductible	19,871 (84.5%)
Standard insurance model	11,298 (48.0%)
Household size (persons)	1.0 (1.0)
Single household	12,611 (53.6%)
Region	
Geneva region	2,996 (12.7%)
Mittelland region	5,294 (22.5%)
Northwestern Switzerland	3,149 (13.4%)
Canton of Zurich	5,332 (22.7%)
Eastern Switzerland	3,037 (12.9%)
Central Switzerland	1,833 (7.8%)
Canton of Ticino	1,874 (8.0%)
Language region	
German-speaking	17,866 (76.0%)
French-speaking	3,673 (15.6%)
Italian-speaking	1,976 (8.4%)
Urban status	
Urban	15,480 (65.8%)
Intermediate	4,955 (21.1%)
Rural	3,080 (13.1%)
Health service utilisation	
Total cost per year (CHF)	19,229 (49,097)
In-patient cost per year (CHF)	1,260 (10,476)
Out-patient cost per year (CHF)	7,276 (13,507)
Medication cost per year (CHF)	4,674 (16,793)
Number of consultations with GP per year	7.0 (12.0)
Number of consultations with specialist per year	8.0 (15.0)
Number of ambulatory hospital consultations per year	8.0 (27.0)

Abbreviations: CHF, Swiss Francs; GP, general practitioner; IQR, interquartile range.

characteristics and continuity score values. This is different for scores calculated for specialist visits only and for ambulatory hospital consultations only. For example, continuity of care with specialists seems to be associated with

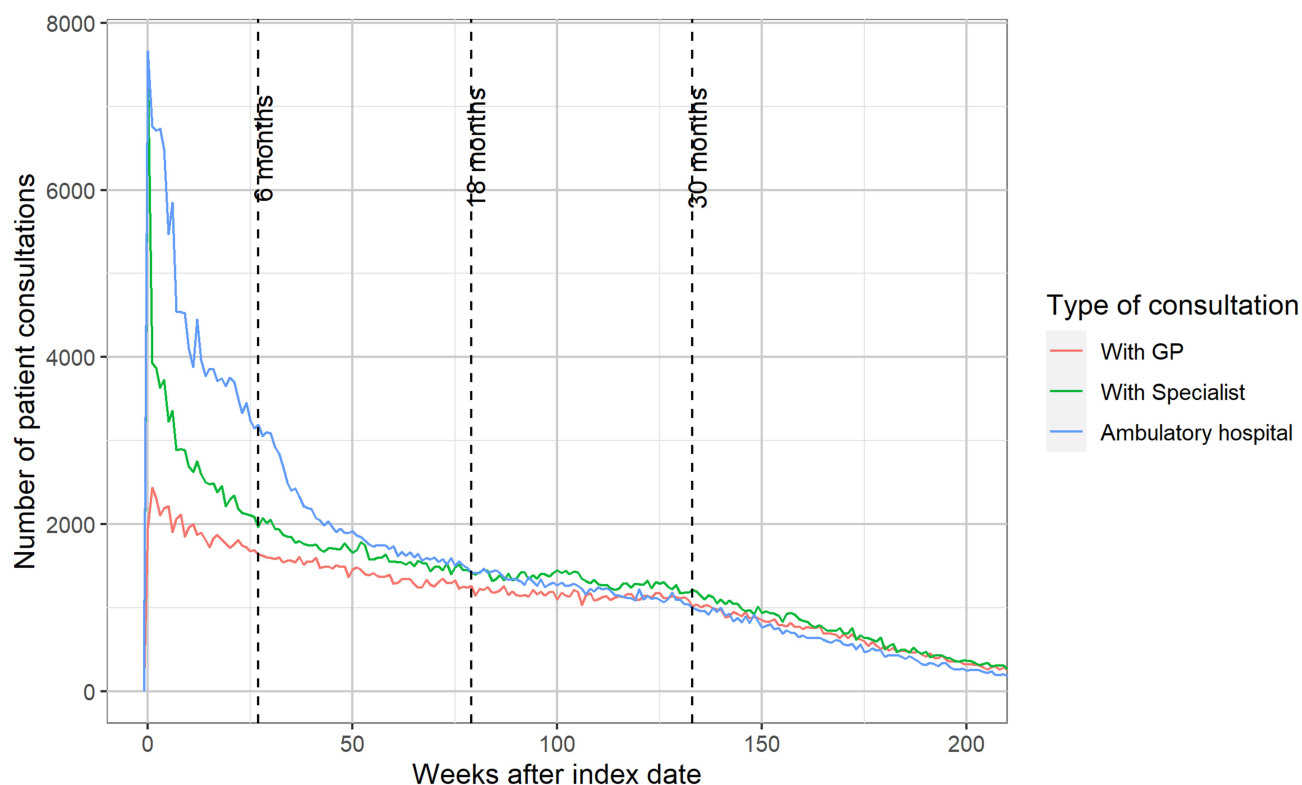


Figure 1 Distribution of consultations over time.

Abbreviation: GP, general practitioner.

participation in a managed care health plan with continuity scores being higher in the managed care population as compared to the standard care model population. The scores also seem to be sensitive to cultural and regional differences.

Table 4 depicts the correlation of health service utilization parameters and score values. The number of consultations with specialists was consistently negatively associated with continuity of care. There was also a consistent negative correlation between the total number of different healthcare providers and continuity of care. The picture was not consistent for consultations with GPs and consultations with ambulatory hospital wards.

Association Between Scores and Outcomes

Multivariate regression analyses revealed that the association between outcomes and continuity scores depended on the type of healthcare provider (Table 5). There was a consistent pattern of beneficial effects of continuity related to GP consultations across the different scales of continuity with respect to costs, death and hospitalization

with the effect estimates for costs and death being statistically significant. There was an inconsistent pattern across the different scales of continuity with respect to effect estimates and statistical significance for consultations with specialists with effect estimates both in the negative and positive direction. For ambulatory hospital wards, high levels of continuity of UPC, MMCI, and SECON were associated with reduced costs and increased risk of death and hospitalization. When the type of healthcare provider was not differentiated, high continuity score values were associated with unwarranted outcomes (higher costs, higher risk of death and hospitalization) (details of regression models are available upon request).

Discussion

This is the first study giving insight into continuity of care in Swiss cancer patients. It indicates that continuity with general practitioners is beneficial in terms of survival, hospitalization and costs. The present study shows that a certain dimension of continuity of care is measurable using data from basic mandatory health insurance. It explores the level of continuity of care in Swiss cancer patients and reveals that continuity of care is generally high. However, continuity of care seems to depend

Table 2 Description of Continuity Scores (6–18 Months After Index Date)

Score	Number of Patients Without Consultations	Number of Patients with Score = 0	Number of Patients with Score = 1	Minimal Value	Maximal Value	Median	Mean	Standard Deviation
All consultations								
UPC	3051	0	1963	0.121	1	0.556	0.591	0.217
MMCI	3051	0	1963	0.016	1	0.810	0.767	0.197
COC	3051	1258	1237	0.000	1	0.333	0.390	0.253
SECON	3051	791	1689	0.000	1	0.577	0.564	0.263
COMP	3051	0	1237	0.040	1	0.565	0.579	0.196
Consultations with GP only								
UPC	7232	0	12,225	0.250	1	1.000	0.934	0.137
MMCI	7232	0	12,225	0.032	1	1.000	0.946	0.139
COC	7232	2210	10,225	0.000	1	1.000	0.768	0.360
SECON	7232	301	8992	0.000	1	1.000	0.883	0.207
COMP	7232	0	6814	0.148	1	0.950	0.876	0.152
Consultations with specialist only								
UPC	6749	0	4807	0.111	1	0.667	0.685	0.250
MMCI	6749	0	4807	0.012	1	0.766	0.710	0.288
COC	6749	4059	2319	0.000	1	0.303	0.368	0.336
SECON	6749	462	8191	0.000	1	1.000	0.837	0.249
COMP	6749	0	1819	0.071	1	0.665	0.644	0.199
Ambulatory hospital consultations only								
UPC	8672	0	8748	0.167	1	1.000	0.882	0.179
MMCI	8672	0	8748	0.020	1	1.000	0.898	0.208
COC	8672	3107	6229	0.000	1	0.781	0.636	0.397
SECON	8672	362	7510	0.000	1	1.000	0.880	0.222
COMP	8672	0	4307	0.095	1	0.852	0.815	0.183

Abbreviations: GP, general practitioner; UPC, Usual Provider Continuity index; MMCI, Modified Modified Continuity Index; COC, Continuity of Care index; SECON, Sequential Continuity index; COMP, composite score.

on sociodemographic and regional factors which may indicate unwarranted variation.

The present study contributes to the methods of measuring continuity of care. As this study used claims data from Swiss basic mandatory health insurance, it was possible to distinguish between consultations with GPs, with specialists and with ambulatory hospital wards. Our study reveals that this distinction is crucial. Multivariate analyses clearly indicate that undifferentiated score values mask beneficial effects and distort the pattern of consultations. To our knowledge, previous studies evaluating continuity of care based on claims data did not consider this differentiation. Based on our results, we clearly recommend stratifying score calculation by healthcare provider.

There are different limitations that need to be considered. First, the present study investigates the general population of cancer patients in Switzerland from the system perspective of basic mandatory health insurance. Therefore, it does not include costs of other parties such as supplementary private insurance, private households, and cantons. However, information relating to consultations and hospitalization is very likely to be complete as it is unlikely that patients did not send in invoices of services that are included in the reimbursement package of mandatory insurance. Secondly, due to the structure of health insurance claims data, we were not able to discriminate between different levels of severity, stage, or therapeutic regimen. Thirdly, the present study does not assess the appropriateness of care on the individual level. For example, care might be measured to be continuous when

Table 3 Median Score Values Calculated in the Basis of Consultations with All Groups of Service Providers by Dichotomous Patient Characteristics

Patient Characteristics	UPC	MMCI	COC	SECON	COMP
All consultations					
Sex	***	**	***	*	***
Male	0.5556	0.8137	0.3476	0.5714	0.5667
Female	0.5312	0.8051	0.3333	0.5714	0.55435
Deductibles	***	***		**	
Low	0.5385	0.8113	0.3381	0.5789	0.5601
High	0.5484	0.8014	0.3333	0.5455	0.5564
Insurance model	***		*	***	
MC	0.549	0.80955	0.34205	0.5455	0.557
Standard	0.53075	0.8104	0.3333	0.6	0.562
Region of living	***	***	***	***	***
Geneva region	0.5	0.7925	0.3063	0.5714	0.5378
Mittelland region	0.5455	0.8074	0.337	0.5938	0.564
Northwestern Switzerland	0.5507	0.8155	0.3468	0.6136	0.577
Canton of Zurich	0.52	0.8003	0.3214	0.5455	0.5401
Eastern Switzerland	0.5714	0.843	0.3871	0.58235	0.5936
Central Switzerland	0.55	0.8245	0.3464	0.54	0.5609
Canton of Ticino	0.5341	0.8104	0.3333	0.56	0.5557
Language region	***	*	***	*	*
German-speaking	0.5455	0.8129	0.3414	0.5714	0.5632
French-speaking	0.5152	0.8007	0.3187	0.5714	0.5457
Italian-speaking	0.5385	0.8131	0.3333	0.56515	0.556
Urban status	**	*	***	*	***
Urban	0.5333	0.8074	0.3333	0.5714	0.5549
Intermediate	0.5385	0.8084	0.3399	0.5806	0.5635
Rural	0.5679	0.8199	0.3673	0.6	0.58345

Notes: * $p < 0.005$ ** $p < 0.01$ *** $p < 0.001$ (Kruskal–Wallis test).

Abbreviations: MC, managed care; GP, general practitioner; UPC, Usual Provider Continuity index; MMCI, Modified Modified Continuity Index; COC, Continuity of Care index; SECON, Sequential Continuity index; COMP, composite score.

in fact it would be better that the patient saw several physicians. In contrast, continuity scales might indicate non-continuous care when in fact this was the most appropriate care for the individual patient. In addition, data from a single health insurance were used. However, this insurance covers 1.2 million Swiss residents (about one-sixth of the total Swiss population) and includes persons from all sociodemographic and clinical subgroups, so that we assume the data are largely representative for Switzerland. The results, however, cannot be transferred to other healthcare settings without caution.

This study clearly shows that scores differently respond to patient-level characteristics that are closely linked with cultural or regional factors such as density of healthcare providers, proximity to central hospitals, or different practices of healthcare providers. This has important

implications for the use of continuity scores. They may be helpful for monitoring trends over time in specific settings, health plans or patient populations or they may help to detect regional variation. However, for interpretations of differences in continuity of care levels across settings or regions' differences in health system and patient behavior and preferences should be taken into account.

The results of our study have implications for future research. Future studies are needed to investigate the role of hospitalizations for continuity of care, and should explore, if and how hospitalizations should be considered in score calculation. Moreover, additional aspects of validity and reliability of the scales should be investigated. Additionally, it would be relevant to explore the role of cultural and supply factors for continuity of care. Moreover, it is likely that

Table 4 Correlation Between Health Service Utilization Parameters and Continuity Scores

	UPC	MMCI	COC	SECON	COMP
Number of consultations with GP	−0.072 ***	0.094 ***	0.002	−0.010	0.009
Number of consultations with specialist	−0.317 ***	−0.123 ***	−0.264 ***	−0.192 ***	−0.254 ***
Number of ambulatory hospital consultations	0.0010	0.324 ***	0.129 ***	0.053 ***	0.129 ***
Total number of consultations	−0.087 ***	0.278 ***	0.053 ***	0.023 *	0.068 ***
Total number of health service providers	−0.385 ***	−0.158 ***	−0.319 ***	−0.227 ***	−0.308 ***

Notes: * $p < 0.005$, *** $p < 0.001$.

Abbreviations: GP, general practitioner; UPC, Usual Provider Continuity index; MMCI, Modified Modified Continuity Index; COC, Continuity of Care index; SECON, Sequential Continuity index; COMP, composite score.

Table 5 Effect Estimates of 60 Different Multivariate Regression Analyses Evaluating the Association Between Four Different Score Values (Months 6–18) and Three Different Outcomes (Months 19–30)

Outcomes (Stratified by Service Provider Group)	Predictors (Continuity Scales)				
	UPC	MMCI	COC	SECON	COMP
All consultations					
Total costs ^a	0.027 *	0.222 ***	0.087 ***	0.033 **	0.089 ***
Death ^b	1.73 ***	3.85 ***	2.01 ***	1.84 ***	2.20 ***
Hospitalization ^b	1.57 ***	2.74 ***	1.77 ***	1.32 **	1.79 ***
Consultations with GP					
Total costs ^a	−0.058 ***	−0.058 ***	−0.035 **	−0.092 ***	−0.077 ***
Death ^b	0.76 ***	0.76 ***	0.80 **	0.78 **	0.81 **
Hospitalization ^b	0.963	0.963	0.936	0.825	0.849
Consultations with specialists					
Total costs ^a	−0.005	0.006	0.106 ***	−0.072 ***	0.098 ***
Death ^b	2.10 ***	2.09 ***	1.81 ***	0.90	1.88 ***
Hospitalization ^b	1.04	1.06	1.09	1.01	1.17
Ambulatory hospital consultations					
Total costs ^a	−0.113 ***	−0.113 ***	0.041 ***	−0.114 ***	−0.013
Death ^b	0.76 ***	0.76 ***	1.17 *	0.71 ***	0.89
Hospitalization ^b	0.74 **	0.74 **	1.12	0.83	0.98

Notes: * $p < 0.005$ ** $p < 0.01$ *** $p < 0.001$. ^a Regression coefficient from multivariate linear regression analysis with costs, hospitalization or death as dependent variable and continuity scales as independent variables adjusted for age, sex, living status, language region, urban status, deductible, health plan, and number of comorbidities. Values < 0 correspond to beneficial effects. ^b Odds ratio from multivariate logistic regression analysis with costs, hospitalization or death as dependent variable and continuity scales as independent variables adjusted for age, sex, living status, language region, urban status, deductible, health plan, and number of comorbidities. Values < 1 correspond to beneficial effects.

Abbreviations: GP, general practitioner; UPC, Usual Provider Continuity index; MMCI, Modified Modified Continuity Index; COC, Continuity of Care index; SECON, Sequential Continuity index; COMP, composite score.

patient subgroups differ in terms of their level and need for continuity. Therefore, future studies should evaluate these scores in other patient populations.

Conclusions

Continuity of care in cancer patients is measurable using health insurance claims data. The existing measurement instruments need to be refined, but they provide a high potential for comparison of cancer care of different patient subgroups, of care settings, of care models, and regions.

They may be especially helpful for evaluation and monitoring of quality improvement measures and for evaluation of the impact of health policy decisions on the quality of care in cancer patients.

Abbreviations

CHF, Swiss Francs; UPC, Usual Provider Continuity; COC, Continuity of Care index; SECON, Sequential Continuity Index; GP, general practitioner; SD, standard deviation.

Data Sharing Statement

The dataset analyzed during the current study is not publicly available because it is part of the confidential Helsana health insurance claims database. Additional information not included in the paper is available from the corresponding author on reasonable request.

Ethics Approval and Informed Consent

The present study is based on pre-existing, de-identified and anonymized data. According to Swiss law, it is therefore exempted from ethical approval and informed consent.

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Author Contributions

EB and MS drafted the first study concept. MN had the lead in analyzing the data. EB drafted the first version of the paper. All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

Disclosure

Eva Blozik, Caroline Bähler, and Markus Näpfli are employees of Helsana Group. Dr Eva Blozik reports grants from Swiss Cancer Research Foundation, during the conduct of the study; grants from Novartis Pharma, Amgen Switzerland, MSD Switzerland, Vifor Pharma, and Swiss Cancer Research Foundation, outside the submitted work. Mr Markus Näpfli reports grants from Novartis Pharma Switzerland, MSD, Amgen, and Vifor, outside the submitted work. The authors report no other conflicts of interest in this work.

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