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Continuity of care in primary care and association with survival in older people:

a 17-year prospective cohort study

Abstract

Background
Although continuity of care is a widely accepted core principle of primary care, the evidence about its benefits is still weak.

Aim
To investigate whether continuity of care in general practice is associated with better survival in older people.

Design and setting
Data were derived from the Longitudinal Aging Study Amsterdam, an ongoing cohort study in older people in the Netherlands. The study sample consisted of 1712 older adults aged ≥60 years, with 3-year follow-up cycles up to 17 years (1992–2009), and mortality follow-up until 2013.

Method
Continuity of care was defined as the duration of the ongoing therapeutic relationship between patient and GP. The Herfindahl–Hirschman Index was used to calculate the continuity of care (COC). A COC index value of 1 represented maximum continuity. COC index values <1 were divided into tertiles, with a fourth category for participants with maximum COC. Cox regression analysis was used to investigate the association between COC and survival time.

Results
Seven hundred and forty-two participants (43.3%) reported a maximum COC. Among the 759 participants surviving 17 years, 251 (33.1%) still had the same GP. The lowest COC category (index >0–0.500) showed significantly greater mortality than those in the maximum COC category (hazard ratio (HR) = 1.20, 95% CI = 1.01 to 1.42). There were no confounders that affected this HR.

Conclusion
This study demonstrates that low continuity of care in general practice is associated with a higher risk of mortality, strengthening the case for encouragement of continuity of care.

Keywords
aged; cohort studies; continuity of patient care; mortality; primary health care.

INTRODUCTION

Continuity of care denotes the connected and coherent care that is consistent with the health needs and personal circumstances of a patient.[1,2] It is considered important to ensure effective and efficient health care and is believed to be essential for high-quality patient care.[3]

Three major types of continuity of care are commonly distinguished, namely management, informational, and relational continuity.[1,2,4,5] Management continuity refers to multidisciplinary and institutional coordination and coherency of the delivery of complementary healthcare services to achieve health goals.[4,6] Informational continuity concerns the availability of previous information among different healthcare providers that is appropriate to the current circumstances of the patient.[2,4,7] Relational continuity, which is most valued in general practice, refers to the ongoing therapeutic relationship between the patient and one or more healthcare providers that bridges episodes of care.[2,4,5]

Nowadays, continuity of care is a widely-accepted core principle of primary care.[6,7] The assumed benefits of continuity of care include a better patient–provider relationship, increased patient satisfaction, improved uptake of preventive care, enhanced adherence to treatment, more accessible health care, and reduced healthcare use and costs.[3,6–17] Especially vulnerable patients, such as older patients, are considered to benefit from continuity of care, as they are likely to have multiple chronic conditions.[6,18] According to Haggerty *et al*,[2] improving continuity of care has become a research priority, as patients increasingly receive care from multiple professionals and organisations.

Despite the assumed benefits of continuity of care, most studies are based on patients' experience and have a limited sample size due to the burden of data collection.[7] According to Wolinsky *et al*,[19] mortality may be the most appropriate criterion to measure the effect of continuity of care, especially in older people. To date, only three studies have investigated the relationship between continuity of care in primary care and mortality. Leleu and Minvielle[7] performed an observational study based on reimbursement claims from the French national health insurance system and found higher continuity of care to be associated with a reduced likelihood of death (adjusted hazard ratio (HR) = 0.96 (95% confidence interval (CI) = 0.95 to 0.96). Wolinsky *et al* used data from the Survey on Assets and Health Dynamics among the Oldest Old (AHEAD) in the US and concluded continuity of care to be associated with substantial reduction in long-term mortality (adjusted HR = 0.84 (95% CI = 0.77 to 0.91)).[19]

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How this fits in

Although continuity of care is a widely-accepted core principle of primary care, Evidence for its benefits is still weak. The present study demonstrates that low continuity of care in general practice is associated with a higher risk of mortality, strengthening the case for encouragement of continuity of care. This study adds to previous research by providing follow-up to 17 years, face-to-face interviews, and broad data coverage.

In a retrospective cohort study among older patients with diabetes in Canada, the higher-continuity group had lower rates of death than the lower-continuity group (8.6% versus 18.5%).[20] Although these three studies found a beneficial effect of continuity of care on mortality, the benefits of continuity of care may depend on the national healthcare context.

Using data from the Longitudinal Aging Study Amsterdam (LASA), this study investigated whether continuity of care in general practice is associated with mortality in Dutch older people. The study was carried out in the Dutch healthcare system, which is characterised by the GP acting as gatekeeper and patients covered by general health insurance.

Mortality was used as the outcome, because death is considered the ultimate criterion to measure the effect of continuity of care.[19]

This study adds to previous research by providing follow-up to 17 years, face-to-face interviews, and broad data coverage. It was hypothesised that discontinuity of general practice care is associated with a higher risk of mortality.

METHOD

Study sample

The LASA is an ongoing cohort study on physical, emotional, cognitive, and social functioning in older people in the Netherlands. The LASA cohort ($n = 3107$) was recruited in 1992 from a random sample of older men and women aged 55–85 years, in the west, north east, and south of the Netherlands. The sample was stratified by age, sex, degree of urbanicity, and expected 5-year mortality. The LASA cohort is representative of the older Dutch population with respect to geographic region and degree of urbanicity. Sampling, data collection, and non-response are described elsewhere.[21,22] Since 1992, longitudinal data have been collected every 3 years. Measurements are performed by trained interviewers, who visit responders at home.

For the present study the first six cycles of data collection were used (1992–1993, 1995–1996, 1998–1999, 2001–2002, 2005–2006, and 2008–2009). Responders were included ($n = 1712$) if they participated in at least three subsequent data collection cycles (starting in 1992–1993) and if there was complete data on their GPs. The time period across which continuity of GP care was determined varied from 7 years (1992–1999) up to 17 years (1992–2009).

Informed consent was obtained from all participants.

Measures

Information about mortality was obtained through linkage with registers of the municipalities in which the responders were living (most recent probing date: 1 November 2013).[23] Mortality follow-up was incomplete for four cases. Survival time was computed as the date of death or the most recent probing date minus the interview date of the last data collection cycle for which the GP was known.

Continuity of care (COC) was defined as the duration of the ongoing therapeutic relationship between patient and GP, that is, relational COC. This type of COC is most valued in primary and mental health care.[1] To calculate the COC, the Herfindahl–Hirschman Index (HHI) was applied:[24,25]

$$H = \sum_{i=1}^{N} S_i^2$$

The HHI is an economic measure of concentration, defined as the sum of squares of market shares, whereas market shares are expressed as fractions.[26] In the present study, S_i^2 is the 'market share' of GP_i and N is the number of different GPs for a specific patient. The number of data collection cycles in which a participant provided the name of a specific GP were counted. Fractions were allowed because participants sometimes reported two different GPs per data collection cycle (both GPs were then counted as ½). This count was subsequently divided by the total number of data collection cycles in which the participant provided the name of a least one GP. These ratios were squared and then summed, resulting in the participant's COC index. The COC index ranges from $1/N$ (minimal continuity, a different GP at each data collection cycle) to 1 (maximal

continuity; the same single GP in all data collection cycles). For example, for a participant reporting GP A (cycle 1 and 2), GP B (cycle 3, 4, 5, and 6), and GP C (cycle 3), the COC index is calculated as: contribution GP A + contribution GP B + contribution GP C = (2/6)^2 + (3.5/6)^2 + (0.5/6)^2 = 0.458.

Based on previous research, the covariates included were age, sex, sociodemographic characteristics, smoking, alcohol use, morbidity, functional limitations, depression, cognition, and personality characteristics.[7,12,19,27–38] Covariates were measured at the last cycle for which GP data were available.

Sociodemographic characteristics included housing (independent or care institution), level of education, level of urbanicity, and partner status. Level of education was divided into low (elementary school or less), middle (lower vocational, general intermediate, intermediate vocational, or general secondary school), and high (higher vocational education, college, or university).[39] Level of urbanicity was assessed using the number of addresses per square kilometre, distinguishing five categories from low (<500) to very high (>2500).[40] Partner status was divided into three categories: no partner, co-residing partner, or partner outside of household. Smoking status was classified as non-smoker, former smoker, or current smoker.[30] Alcohol use was assessed by using the Garretsen indicator of alcohol use, distinguishing three categories: no, light, and moderate to very excessive use of alcohol.[41]

Morbidity was assessed by self-report of seven major chronic diseases: chronic pulmonary disease, cardiac disease, peripheral arterial disease, diabetes mellitus, stroke, osteoarthritis or rheumatoid arthritis, and cancer. These self-reported answers have been found to correspond well with information from GPs across the full study period.[42]

Functional limitations were assessed by six self-reported questions about experienced difficulty in doing daily activities, counting the number of items 'with some difficulty' or worse (range 0–6; internal reliability 0.85).[43] These activities included walking up and down stairs, walking outside the house, use of transportation, dressing oneself, sitting down and rising from a chair, and cutting own toenails.

Depressive symptoms were measured using the 20-item Center for Epidemiologic Studies Depression scale (CES-D; range 0–60; cutoff for depression ≥16).[44,45]

Cognition was assessed by means of the mini-mental state examination (MMSE; range 0–30; cutoff for cognitive impairment ≤24).[46]

Personality characteristics were assessed by sense of mastery, self-efficacy, and self-esteem. Sense of mastery is defined as the extent to which one views one's life as within one's control as opposed to being ruled by chance or other people. It was measured by the seven-item Pearlin Mastery Scale (range 7–35).[47] Self-efficacy is defined as the belief of a person in their ability to organise and execute certain behaviours that are necessary to produce given attainments. It was measured by a 12-item version of the General Self-Efficacy Scale (GSES- 12; range 12–60).[48] Self-esteem reflects a person's overall evaluation or appraisal of their own worth. It was measured by an adapted four-item version of the Rosenberg Self-Esteem Scale (range 4–20).[36,49]

Analysis

The association between COC and survival time was investigated using Cox regression analysis. In preliminary analyses there was a non-linear association between the COC index and mortality. Therefore, it was divided into four categories. The first category included the COC index value of 1 representing maximum continuity. COC index values <1 were divided into tertiles. Bivariate comparisons were performed to examine the associations of the main

Table 1. Distribution of participants over the data collection cycles

Cycle	1992–1993	1995–1996	1998–1999	2001–2003	2005–2006	2008–2009
Participants	1712 (100%)	1712 (100%)	1712 (100%)	1300 (75.9%)	955 (55.8%)	759 (44.3%)
COC, mean ± SD	–	–	0.74 ± 0.25	0.73 ± 0.25	0.71 ± 0.25	0.70 ± 0.24
Low COC (0.220–0.500)	–	–	370 (21.6%)	313 (18.3%)	228 (13.3%)	197 (11.5%)
Moderate COC (0.501–0.556)	–	–	290 (16.9%)	189 (11.0%)	181 (10.5%)	145 (8.5%)
High COC (0.557–0.999)	–	–	310 (18.1%)	290 (16.9%)	201 (11.7%)	166 (9.7%)
Maximum COC (1.000)	–	–	742 (43.3%)	508 (29.7%)	345 (20.2%)	251 (14.7%)

COC = continuity of care. SD = standard deviation.

Table 2. Sample characteristics by the four continuity of care index categories

	Overall	Low COC (>0–0.500)	Moderate COC (0.501–0.556)	High COC (0.557–0.999)	Maximum COC (1.000)	*P*-value
Sample size	1712	370	290	310	742	
Men, %	45.1	44.3	47.6	41.6	46.0	0.465[a]
Age in years, mean ± SD	1712	79.9 ± 7.2	80.4 ± 7.2	79.5 ± 7.0	79.6 ± 7.4	0.392[b]
Age group, years	1712					0.761[c]
60–74, %	25.2	24.3	22.1	26.8	26.1	
74–79.5, %	24.7	25.7	27.9	24.8	22.9	
79.5–85, %	25.4	25.9	22.8	25.2	26.1	
≥85, %	24.8	24.1	27.2	23.2	24.8	
Housing	1712					0.155[a]
Independent, %	92.2	90.0	91.0	92.3	93.7	
Care institution, %	7.8	10.0	9.0	7.7	6.3	
Education	1711					0.645[c]
Low, %	59.7	60.8	57.2	55.5	61.9	
Middle, %	28.3	28.1	30.7	29.4	27.0	
High, %	12.0	11.1	12.1	15.2	11.1	
Partner status	1691					0.243[a]
No partner, %	49.3	54.5	46.3	47.6	48.5	
Co-residing partner, %	47.4	41.5	51.2	48.9	48.2	
Partner outside household, %	3.4	4.1	2.5	3.6	3.3	
Level of urbanicity (1–5; mean ± SD)	1710	3.2 ± 1.3	2.9 ± 1.4	3.1 ± 1.4	2.9 ± 1.4	0.006[c]
Low (<500), %	17.2	16.8	21.4	14.2	17.0	
Low middle (500–1000), %	23.3	12.7	19.3	27.2	28.5	
Middle (1000–1500), %	17.4	18.9	21.7	15.9	15.7	
High (1500–2500), %	23.9	34.3	19.0	22.3	21.2	
Very high (≥2500), %	18.2	17.3	18.6	20.4	17.7	
Smoking	1454					0.364[a]
Non-smoker, %	34.3	30.5	32.3	36.4	36.2	
Former smoker, %	51.2	52.6	53.6	52.0	49.0	
Current smoker, %	14.5	16.8	14.1	11.5	14.8	
Alcohol use	1446					0.700[a]
No, %	25.7	22.6	27.5	25.8	26.5	
Light, %	52.8	53.8	49.4	53.9	53.1	
Moderate to very excessive, %	21.5	23.6	23.1	20.2	20.4	
Morbidity (0–7; mean ± SD)	1689	2.0 ± 1.0	2.1 ± 1.0	2.0 ± 1.0	2.0 ± 1.0	0.253[d]
No disease, %	8.1	9.2	7.1	9.5	7.4	
1 disease, %	22.3	21.1	20.6	19.9	24.6	
2 diseases, %	27.4	25.7	26.2	26.8	29.0	
3 or more diseases, %	42.2	43.9	46.1	43.8	39.1	
Functional limitations (0–6; mean ± SD)	1626	2.4 ± 2.1	2.6 ± 2.2	2.5 ± 2.1	2.3 ± 2.1	0.186[d]
No, %	26.7	28.4	22.2	26.2	27.7	0.292[a]
Yes, %	73.3	71.6	77.8	73.8	72.3	
Cognition (0–30; mean ± SD)	1687	25.8 ± 3.9	26.0 ± 3.7	26.0 ± 3.8	26.0 ± 3.9	0.941[d]
<24, %	18.7	20.3	19.1	18.0	18.1	0.816[a]
≥24, %	81.3	79.7	80.9	82.0	81.9	
Depression (0–60; mean ± SD)	1666	10.5 ± 7.7	11.2 ± 8.3	10.3 ± 7.6	10.0 ± 7.1	0.482[d]
<16, %	80.1	79.7	76.8	80.7	81.3	0.450[a]
≥16, %	19.9	20.3	23.2	19.3	18.7	
Mastery (7–35; mean ± SD)	1450	22.9 ± 3.9	22.5 ± 4.3	22.6 ± 4.1	23.0 ± 4.1	0.390[b]
Self-efficacy (12–60; mean ± SD)	1470	41.2 ± 5.2	41.3 ± 5.7	40.8 ± 5.5	40.8 ± 5.3	0.573[b]
Self-esteem (4–20; mean ± SD)	1471	14.8 ± 2.4	14.8 ± 2.5	15.1 ± 2.2	15.0 ± 2.3	0.552[b]

[a]Analysed with the χ^2 test. [b]Analysed with one-way ANOVA test for continuous variables. [c]Analysed with linear-by-linear association. [d]Analysed with non-parametric Kruskal–Wallis test for skewed and not normally distributed variables. COC = continuity of care. SD = standard deviation.

outcome mortality with all covariates.

Confounding was investigated by manually introducing all covariates into the basic model. A covariate was considered a confounder if the coefficient of COC changed by more than 10%. Effect modification was

investigated by calculating interaction terms of each covariate with COC. Dummies were used to investigate categorical covariates. For COC, the group with maximum COC (index = 1) was used as reference group. Responders participated in three, four, five, or six data collection cycles, corresponding with different periods of data collection. Survival time was calculated starting from the interview date of last data collection. Although this approach made optimal use of available data, responders participating in more data collection cycles may have been younger and healthier, but at the same time their survival time was calculated from a later interview date. In addition, participants who died relatively early may have had a limited number of data collection cycles. To account for this, the patient's final wave of data collection was used as a stratification variable and allowed baseline hazards to differ between these strata.

The level of statistical significance was set at $P<0.05$. Data were analysed using SPSS (version 22).

RESULTS

Seven hundred and forty-two participants (43.3%) reported a maximum COC, indicating that almost half of older adults had the same GP for at least 6 years. Frequencies for low, moderate, and high COC were 370 (21.6%), 290 (16.9%), and 310 (18.1%), respectively, after the third data collection cycle. Among the 759 participants surviving 17 years, 251 (33.1%) still had the same GP (Table 1). The mean and median of the COC index were 0.74 and 0.72.

The COC index did not show differences across characteristics as measured during the last cycle at which GP data were available, except for level of urbanicity

Table 3. Bivariate Cox regression analysis: association between mortality and covariates

	N	HR	95% CI	*P*-value
Sex (female versus male)	1708	0.70	0.62 to 0.80	<0.001
Age in years	1708	1.07	1.06 to 1.08	<0.001
Housing (care institution versus independent)	1708	2.44	2.01 to 2.96	<0.001
Education	1707			0.556
Low	1020	1.10	0.90 to 1.36	0.351
Middle	483	1.05	0.83 to 1.31	0.695
High[a]	204			
Partner status	1687			
No partner	831	1.48	1.30 to 1.69	<0.001
Partner outside household	57	1.27	0.89 to 1.83	0.189
Co-residing partner[a]	799			
Level of urbanicity	1707	1.06	1.01 to 1.11	0.020
Smoking	1452			<0.001
Non-smoker[a]	498			
Former smoker	744	1.13	0.97 to 1.32	0.128
Current smoker	210	1.80	1.47 to 2.20	<0.001
Alcohol use	1444			0.286
No[a]	371			
Light	763	0.92	0.78 to 1.08	0.309
Moderate to very excessive	310	0.85	0.69 to 1.04	0.117
Morbidity	1685			0.003
No chronic disease[a]	137			
1 disease	376	1.06	0.81 to 1.38	0.688
2 disease	461	1.27	0.98 to 1.65	0.072
3 or more diseases	711	1.38	1.07 to 1.77	0.012
Functional limitations	1622	1.41	1.33 to 1.49	<0.001
Cognition	1687	0.94	0.92 to 0.95	<0.001
Depression	1662	1.03	1.02 to 1.03	<0.001
Mastery	1449	0.95	0.94 to 0.97	<0.001
Self-efficacy	1466	0.98	0.97 to 1.00	0.007
Self-esteem	1467	0.98	0.96 to 1.01	0.264

[a]*Reference category. HR = hazard ratio.*

Table 4. Cox regression analysis: association between mortality and continuity of care index, stratified by number of data collection cycles

	N	HR	95% CI	*P*-value
COC index categorical[a]	1708			0.033
Low	369	1.20	1.01 to 1.42	0.034
Moderate	289	1.17	0.98 to 1.41	0.083
High	310	0.93	0.77 to 1.12	0.435
Maximum COC[b]	740			

[a]Low COC >0–0.500; moderate COC 0.501–0.556; high COC 0.557–0.999; maximum COC 1.000. [b]Reference category. COC = continuity of care. HR = hazard ratio.

(*P*<0.006; Table 2). In less urban areas COC tended to be higher than in highly urban areas.

In bivariate analysis, the covariates male sex, higher age, institutional care, no partner, higher level of urbanicity, current smoking, moderate to very excessive alcohol use, three or more chronic diseases, functional limitations, impaired cognition, depressive symptoms, lower mastery, and lower self-efficacy were associated with mortality (Table 3). No confounders were found that changed the hazard ratios of the main determinant by more than 10%.

As participants with six data collection cycles (that is, period of data collection and shortest period since the last GP registration) had a better survival compared with other participants (Appendix 1), they were stratified by the number of data collection cycles (six versus three, four, or five cycles). In the final model, participants in the lowest COC category showed significantly greater mortality than those in the maximum COC category (HR = 1.20, 95% CI = 1.01 to 1.42; Table 4).

The number of participants in this study decreased from 1712 (100%) in 1992–1993 to 759 (44.3%) in 2008–2009. Attrition in LASA can be attributed for the largest part to mortality, and to a lesser extent to refusal, frailty, or the inability to communicate.[22]

DISCUSSION

Summary

This study investigated the association between continuity of care in general practice and mortality in older people during 17 years of follow-up (1992 to 2009). Continuity of care (COC) was defined as the duration of the ongoing therapeutic relationship between patient and GP, and was calculated using the Herfindahl–Hirschman Index. The lowest COC category (index >0–0.500) showed a 20% increased likelihood of mortality compared with the category representing maximum COC. According to the study hypothesis, discontinuity of general practice care was found to be associated with a higher risk of mortality.

Strengths and limitations

Of the few studies that have investigated the relationship between continuity of care in general practice and mortality,[7,19] the present study is the first to provide a follow-up period up to 17 years. Other strengths of the study are the representative sample, the continuity of care calculation that allows fractions (that is, having more than one GP at the same time), and multiple follow-up periods per patient. Another strength is the broad data coverage of the LASA database, which enabled investigation of important associations with mortality and continuity of care, and to adjust for relevant confounders. The study's confirmation of well-known associations between mortality and each of the variables sex, age, partner status, smoking, morbidity, functional limitations, cognition, depression, and mastery illustrates the robustness of the data.

For the interpretation of the results, some limitations need to be considered. First, the study focused on relational continuity of care and defined continuity of care as the duration of the ongoing therapeutic relationship between a patient and their GP(s),[1,5] using a calculation that takes into account the number of GPs, change(s) of GP(s), and the length of the respective therapeutic relationships. However, there are many other ways to define and measure continuity of care, such as concentration (the proportion of consultations with one specific provider) and sequence (whether each consultation was with the same provider as the previous consultation).[1,5,11,50]

A limitation of the study's continuity of care measure is that it does not take into account how often, or how seldom, a patient may see their provider. For example, a patient for whom a long-term therapeutic relationship was observed may never seek care from that provider and hence will have very little interaction with that provider. Insight into the frequency with which care was sought (and with whom) would have enabled alternative continuity of care measures to be calculated, therefore enriching the data and their interpretation. The LASA database unfortunately does not provide data on consultation level.

Second, a change of GP may be due to different — intentional and unintentional — reasons, including preferring another

health provider (patient), retirement (GP), moving (patient or GP), or conflict (patient and GP). As different reasons for change may be associated with a different quality of the patient–provider relationship, one may suggest that adding the covariate 'reason for change of GP' could improve the final model. However, given the absence of supportive evidence, it is unlikely that the covariate 'reason for change of GP' is a confounder (that is, that it correlates with both continuity of care and mortality) and therefore unlikely that adding this covariate will significantly change the final model.

Comparison with existing literature

Three previous studies found a beneficial effect of continuity of care on mortality in a primary care population. Leleu and Minvielle performed an observational study based on reimbursement claims from the French national health insurance database for salaried workers between 2007 and 2010.[7] They found higher continuity of care in primary care to be associated with a reduced likelihood of death (adjusted HR = 0.96 [95% CI = 0.95 to 0.96]). Wolinsky *et al* used data from the Survey on Assets and Health Dynamics among the Oldest Old (AHEAD) with up to 12 years of follow-up between 1991 and 2005.[19] They concluded that continuity of care with a primary care physician was associated with substantial reduction in long-term mortality (adjusted HR = 0.84 [95% CI = 0.77 to 0.91]). In a retrospective cohort study of patients with diabetes aged ≥65 years, the higher-continuity group had lower rates of death (8.6% versus 18.5%) than the lower-continuity group.[20]

As the present study showed, patients with relatively short-term therapeutic relationships with several GPs had a shorter survival than patients with the same single GP during the full follow-up period. These results add to the studies of Leleu and Minvielle,[7] Wolinsky *et al*,[19] and Worrall and Knight:[20] high continuity of care is related to lower mortality, and this relationship appears to exist across different healthcare contexts and for different measures of continuity of care. Comparing the group characteristics of low, moderate, high, and maximum continuity of care does not reveal another explanation, as only few characteristics were found to be associated with continuity of care (Table 2).

Implications for research

Although continuity of care is a widely-accepted core principle of primary care, the evidence about its benefits is still weak, especially when it comes to health outcomes. The present study demonstrates that low continuity of care in general practice is associated with a higher risk of mortality, strengthening the case for encouragement of continuity of care. The theoretical framework of continuity of care, however, is complicated and many components are involved — at patient, doctor, and system level. Further research should acknowledge this complexity and measure the involved components separately,[50] to differentiate the good and adverse effects of continuity of care.

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Ethical approval

The medical ethics committee of the VU University Medical Center approved the study (reference nos 92/138 and 2002/141).

Provenance

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Competing interests

The authors have declared no competing interests.

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Appendix 1. Survival function of participants with three, four, five, or six data collection cycles showing better prognosis (5-year survival) for responders who participated in all six waves.