CHAPTER 3

CONTINUITY OF CARE AND REFERRAL RATE: CHALLENGES FOR THE FUTURE OF HEALTH CARE

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Submitted
ABSTRACT

Background

Continuity of Care (CoC) potentially reduces the health care consumption of patients. CoC can reduce the number of referrals to specialist care. It is unknown whether there is a difference for the referral to specific medical specialties. We want to determine the relationship between CoC and referral rate (the number of referrals per patient per year), and second for which medical specialties this relationship is strongest.

Method

A retrospective cohort study of 19,333 patients in the primary care setting in Northern Netherlands (2013-2014). Number of contacts with patients’ own GP and other GPs were calculated, and referral rates were determined. CoC was defined as a dichotomous variable (absent or present) or as percentage of number of contacts.

Results

The odds for being referred is higher for older patients, females, and patients with a high number of contacts. The OR for CoC was the highest predictive factor for the referral rate (OR: 0.817). The referral rate is specifically higher for patients with a low CoC that are referred to Pediatrics.

Conclusion

Patients that only contacted their own GP were almost 20% less likely to be referred to specialist care. When CoC is low, the odds of being referred to Pediatrics is higher. Even though developments put pressure on CoC (GPs who work part-time, pressure for longer opening hours) policymakers should invest in this cornerstone of primary care to temper healthcare expenditures.
INTRODUCTION

As healthcare costs are on the rise, an increasing part of the Gross Domestic Product (GDP) is spent on health care (Lorenzoni, Belloni & Sassi 2014). Policymakers try to restrain budgets from being exceeded by availing themselves with a variety of measures. One of the measures that can tame healthcare spending and count on the approval of both policymakers and field experts is a strong primary care system (Kocher, Chigurupati 2016, Kringos et al. 2013). In a strong primary care system, the General Practitioner (GP) is the gatekeeper who refers patients to specialist care in the hospital (Allen et al. 2011). The Netherlands adopted such a primary care system long ago. In this system, patients are registered to a single GP (henceforth: ‘own GP’).

If GPs are able to prevent unnecessary referrals to specialist care, this could have a reducing effect on healthcare costs. A factor that potentially reduces the number of referrals per patient is Continuity of Care (CoC) (O’Donnell 2000). CoC is the relationship between a GP and a patient that extends beyond a single episode of illness (Saultz 2003). CoC is regarded to be one of the cornerstones of primary health care (Allen et al. 2011). There are several dimensions of CoC: informational (availability of patients records), longitudinal (long-term relation) and interpersonal (relation with the same GP) continuity (Saultz 2003). Previous literature has hypothesized that when patient and GP are familiar with each other (interpersonal and longitudinal continuity), the patient can be reassured by the GP more effectively and fewer unnecessary referrals are required to answer the patient’s questions (Saultz, Albedaiwi 2004).

Previous literature has demonstrated that CoC has a moderating effect on the number of hospital admissions (Bayliss et al. 2015, Cheng, Chen & Hou 2010, Chauhan et al. 2012,
Barker, Steventon & Deeny 2017). Patients have more confidence in their GP and are more satisfied with their GP when they experience CoC (Saultz, Albedaiwi 2004, Adler, Vasiliadis & Bickell 2010, Mainous et al. 2001, Nutting et al. 2003). CoC also leads to lower healthcare costs (De Maeseneer et al. 2003, Hollander, Kadlec 2015). In Norway, CoC led to a lower number of referrals to hospital care (Hansen et al. 2013). In the United States absence of CoC was associated with more specialist care per patient and higher healthcare costs (Starfield et al. 2009, Raddish, Horn & Sharkey 1999). For the Dutch primary health care system and its specific characteristics, it is unknown what the strength between CoC and referral rate is.

It is unknown for the referrals to which medical specialties CoC is most important. For some specialties and illnesses it could be more evident that a patient needs referral to specialist care than for others. For example, for surgical specialties, in which illness and the need for referral can be better defined, referral could be less dependent of the GP. For other specialties, illnesses and the need for specialist care could be less clear and referral could be more dependent of the GP and the CoC (for example in the case of medically unexplained physical symptoms (MUPS)).

This study was conducted to analyze two research questions – to determine the relationship between CoC and referral rate (the number of referrals per patient per year) in a Dutch primary care setting and for which medical specialties this relationship is the strongest.
METHODS

Design

This is a retrospective cohort study with data from the Registration Network Groningen (RNG). The RNG is a register of all patient contacts from three large primary care centers in the northern part of the Netherlands, where on average 17 GPs work. All these patient contacts are coded with the International Classification of Primary Care (ICPC) codes. About 30,000 patients are registered with the RNG. The register is representative of the national population (Biermans et al. 2008).

Patients

Patients were included in the cohort when they had two or more face-to-face contacts with a GP from the practice the patient is registered in during the two-year study period (2013-2014). Patients with one or no contacts were excluded, as they had too few contacts to ensure a good relationship with their GP. Both consultations at the practice and home-visits were included. Telephone calls and e-mail consultations were excluded as they were less traceable to the GP.

Demographic data was collected (age and sex) for every patient. We also collected the number of face-to-face contacts of the patient with a GP, both consultations at the GP’s office, and home visits. We determined the number of contacts that patients had with the GP they are registered with (“own GP”) and the number of contacts with other GPs. The number of referrals per patient during the study period was determined, as was the medical specialty they were referred to. When there were fewer than 50 referrals to a medical
specialty during the two-year study period, that specialty was not separately analyzed in the second part of the analysis (the relation between CoC and medical specialty).

Continuity of Care (CoC) was defined as a dichotomous variable. It is present when patients only had face-to-face contacts with their own GP during the previous two years. When patients had one or more contacts with another GP, CoC is absent. This definition is in line with the definition of CoC in earlier literature (Barker, Steventon & Deeny 2017, Hansen et al. 2013).

In order to evaluate the relative contribution of CoC of individual medical specialties we compared CoC percentages per specialism. A CoC percentage was calculated as the share of contacts with the patients’ own GP opposed to the total number of contacts. The relative contribution was calculated by comparing the CoC percentage for patients who were referred to a specific medical specialty with the CoC percentage of all others who were not.

**Main and secondary outcome measures**

The main outcome measure is the referral rate, defined as the number of referrals per patient per year. These referrals comprise both referrals to specialist care for outpatient consultation and treatment, as well as referrals for hospitalization due to acute illnesses. Referrals to other institutions (for example physical therapy and psychology) were not included in the referral rate. The secondary outcome is the medical specialty where the patient is referred to.
**Statistical analysis**

We used descriptive statistics to calculate the patients’ age, sex, and number and type of referrals. The main outcome measure (number of referrals) was not normally distributed, therefore we used a Poisson regression analysis to determine the relation between number of referrals and CoC. CoC was included as a dichotomous variable (1=CoC, 0=no CoC). The relation between number of referrals and CoC was adjusted for the influence of the age and sex of patients, as well as for the number of contacts patients had with GPs during the study period (when patients have many contacts with GPs, odds are higher of them being referred to specialist care). Odds Ratios and 95% confidence intervals were calculated.

To determine the relation between medical specialty and CoC, we tested whether the CoC percentage of referred patients was different compared to non-referred patients. Since this outcome variable was normally distributed, a student T-test was used to analyze the data for statistical significant differences. All statistical analyses were performed using SPSS 20.0 with a significance level of p<0.05.

**RESULTS**

Demographic patient data is presented in Table 1. After excluding patients that had <2 contacts with a GP during the study period, 19,333 patients remained in the dataset. These patients visited their GP on average 5.67 times (range 2-84) in two years. For every 100 patients per year, on average 41.5 referrals to specialist care were made. Approximately one quarter of the patients only had contact with their own GP (=CoC is present).
The relation between CoC, patient characteristics and number of referrals (all referrals together) is presented in Table 2. The odds of being referred is higher for older patients, for females and for patients with a higher number of contacts with the GP. CoC was the strongest factor associated to number of referrals (OR: 0.817), corrected for the other characteristics (age, sex and number of contacts). When CoC is present, the odds of being referred are lower than when CoC is absent.

**Table 1. Demographic patient data (n=19,333)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>42.0 (±22.9)</td>
</tr>
<tr>
<td><strong>Sex (female)</strong></td>
<td>10,836 (56.0%)</td>
</tr>
<tr>
<td><em><em>Contacts</em> (during 2 years)</em>*</td>
<td>5.67 (4.8)</td>
</tr>
<tr>
<td><strong>Number of referrals (during 2 years) per patient</strong></td>
<td>0.83 (1.1)</td>
</tr>
<tr>
<td><strong>Continuity of Care</strong></td>
<td></td>
</tr>
<tr>
<td>- Present</td>
<td>4910 (25.4%)</td>
</tr>
<tr>
<td>- Absent</td>
<td>14423 (74.6%)</td>
</tr>
</tbody>
</table>

*Data are presented as mean (SD) or number (%).

*Patients with <2 contacts during 2 years were excluded*

**Table 2. Relation between Continuity of Care, demographic factors and number of referrals**

<table>
<thead>
<tr>
<th></th>
<th>OR</th>
<th>95% Confidence Interval</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex (male)</strong></td>
<td>0.960</td>
<td>0.930-0.991</td>
<td>0.011</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>1.006</td>
<td>1.005-1.007</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Number of contacts</strong></td>
<td>1.050</td>
<td>1.048-1.052</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Continuity of Care</strong> (present)</td>
<td>0.817</td>
<td>0.785-0.851</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*OR: Odds Ratio*
Table 3 presents the difference in percentage of CoC per medical specialty. For five medical specialties - gastroenterology, ophthalmology, psychiatry, dermatology and neurology - the number of referrals is higher for patients with a high CoC percentage compared to low CoC percentage. For one medical specialty, pediatrics, the number of referrals is higher for patients with a low CoC percentage.

**DISCUSSION**

*Summary*

This study found a statistically significant relation between referral rate and Continuity of Care. Patients that were only seen by their own GP during the two-year study period were almost 20% less likely to be referred to specialist care than patients who were also seen by other GPs (OR 0.817). In comparison to other medical specialism the percentage CoC is very low for children referred to a paediatrician (53%).

*Strengths and limitations*

This study included almost 20,000 patients from a representative sample of the Dutch population (Biermans et al. 2008). All patients were included, in contrast to a previous study in which only patients aged >30 were included (Hansen et al. 2013). In addition, we only used electronic patient files as source of data instead of the patients’ recollection (Hansen et al. 2013) of the consultations, as we feel that these data are more reliable. The RNG is considered to be a reliable and accurate data source and over the years it has proven to be so. These factors will have improved the reliability and generalizability of our study.
### Table 3. Mean continuity of care (CoC) per medical specialty (n=19,333)

<table>
<thead>
<tr>
<th>Specialty</th>
<th>CoC when referred</th>
<th>CoC when not referred</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anesthesiology</td>
<td>0.68</td>
<td>0.60</td>
<td>0.062</td>
</tr>
<tr>
<td>Cardiology</td>
<td>0.62</td>
<td>0.60</td>
<td>0.196</td>
</tr>
<tr>
<td>Surgery</td>
<td>0.61</td>
<td>0.61</td>
<td>0.939</td>
</tr>
<tr>
<td>Dermatology</td>
<td>0.63</td>
<td>0.60</td>
<td>0.002*</td>
</tr>
<tr>
<td>Gynecology</td>
<td>0.63</td>
<td>0.60</td>
<td>0.091</td>
</tr>
<tr>
<td>Internal Medicine</td>
<td>0.61</td>
<td>0.60</td>
<td>0.571</td>
</tr>
<tr>
<td>Dental Surgery</td>
<td>0.59</td>
<td>0.60</td>
<td>0.741</td>
</tr>
<tr>
<td>ENT Medicine</td>
<td>0.60</td>
<td>0.61</td>
<td>0.495</td>
</tr>
<tr>
<td>Neurology</td>
<td>0.64</td>
<td>0.63</td>
<td>0.003*</td>
</tr>
<tr>
<td>Pulmonology</td>
<td>0.61</td>
<td>0.61</td>
<td>0.782</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>0.66</td>
<td>0.60</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>0.65</td>
<td>0.60</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>0.62</td>
<td>0.60</td>
<td>0.276</td>
</tr>
<tr>
<td>Plastic Surgery</td>
<td>0.61</td>
<td>0.61</td>
<td>0.702</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>0.53</td>
<td>0.61</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Psychiatry</td>
<td>0.64</td>
<td>0.60</td>
<td>0.001*</td>
</tr>
<tr>
<td>Rheumatology</td>
<td>0.61</td>
<td>0.61</td>
<td>0.783</td>
</tr>
<tr>
<td>Rehabilitation Medicine</td>
<td>0.62</td>
<td>0.60</td>
<td>0.430</td>
</tr>
<tr>
<td>Sports Medicine</td>
<td>0.55</td>
<td>0.61</td>
<td>0.127</td>
</tr>
<tr>
<td>Urology</td>
<td>0.62</td>
<td>0.60</td>
<td>0.242</td>
</tr>
<tr>
<td>Vascular Surgery</td>
<td>0.62</td>
<td>0.61</td>
<td>0.741</td>
</tr>
</tbody>
</table>

Mean Continuity of Care (CoC) when patients were either referred or not referred to specialist care. *p*-value <0.05; CoC when referred higher than CoC when not referred

**p*-value <0.05; CoC when referred lower than CoC when not referred
Limitations of this study are that we did not correct for other factors that can influence referral rate such as income, education, comorbidity and self-rated health. We did not examine the effects of partial CoC either – that is CoC provided by the same two GPs who fill in for each other. This system may also be having a tempering effect on the referral rate. Lastly, we did not include the various other contacts of patients with other personnel of the general practice, even though the contacts with the medical assistant or primary care nurse can also be an important part of CoC.

Comparisons with existing literature

Previous literature also found a statistically significant lower referral rate in patients when CoC was present (Hansen et al. 2013, Starfield et al. 2009, Raddish, Horn & Sharkey 1999). These studies defined CoC by its longitudinal dimension (long-term relationship) or its interpersonal dimension (always the same GP). This study is the first to use the combination of both a longitudinal (two years) and a personal relation (only 1 GP) to explain the effect of CoC on referral rates. The outcomes support the hypothesis that providing CoC can reduce the number of referrals to specialist care, which ultimately could reduce healthcare costs.

The Dutch primary care system promotes both a longitudinal and an interpersonal relation between patient and GP. However, nowadays there are several threats to Continuity of Care. In recent decades increasing numbers of medical students are female (House 2009, Jefferson, Bloor & Maynard 2015), and the same trend is seen in primary health care (House 2009). Female GPs are less likely to work full-time and are less willing to be self-employed (Peckham 2015). These developments threaten CoC, as patients are less likely to be able to visit their own GP exclusively.
Another threat is the 24/7 economy. Patients are used to everything being available round-the-clock – stores have long opening hours every day of the week, purchases can be made online whenever the customer wants. This trend can make it more likely that patients will consult a GP outside standard weekday opening hours. There is already a tremendous increase in consultations at out-of-hour GP services that cannot solely be explained by an aging society (Smits et al. 2014). This trend is also a threat to CoC.

It is to be expected that these trends will continue to put pressure on continuity of care. In light of these developments GPs, patients and policymakers have to work together to create solutions to improve CoC. The establishment of duo practices could be promoted, where two GPs ensure continuity for their patients. GPs could also be encouraged to offer longer or more differentiated opening hours, as opposed to the traditional 8 AM to 5 PM hours.

This study also analyzed the relation between CoC and medical specialty. An interesting finding is that patients are referred more often to pediatrics when CoC is low. This could be due to the lack of trust and confidence children’s parents have in an unfamiliar GP (due to low CoC), or the inability of a GP to reassure the parents of an unknown patient. This finding could be used for educational purposes, and provides a focus on which residents can be trained to reduce unnecessary referrals.

We also found that patients are more often referred to gastroenterology, ophthalmology, psychiatry, dermatology and neurology when the CoC percentage is higher opposed to patients that are not referred. Possibly this is due to the fact that many referrals for these specialties are not emergencies and patients are willing to wait to consult their own GP in order to be referred. This is the case, for example, when it comes to chronic abdominal pain
and rectal bleeding for gastroenterology, cataract for ophthalmology and radicular pain for neurology. But other explanations could also be valid.

**Implications for practice**

Continuity of Care (CoC) is associated with fewer referrals to hospital care. This effect is largest for referrals to pediatrics. This study supports the importance of CoC. Even though present developments – more GPs working part-time, higher expectations of GP opening hours – put pressure on CoC, policymakers should invest in this cornerstone of primary care to temper healthcare expenditures.

**Competing interests**

No funding sources were used to support this study.

The study was conducted in accordance with the regulations of the Medical Ethical Board of University Medical Center Groningen, the Netherlands.

All authors have declared no competing interests.
REFERENCES


