

# How should continuity of care in primary health care be assessed?

Chris Salisbury, Fiona Sampson, Matthew Ridd and Alan A Montgomery

## ABSTRACT

Recent changes in the organisation of primary health care have increased the range of professionals that patients may encounter, leading to renewed interest in the importance of continuity of care. To assess whether organisational changes have had an impact on continuity, it is necessary to define and measure the term. Researchers seeking to assess continuity face many conceptual and practical difficulties. This article argues that it is important to distinguish between three distinct but related concepts: longitudinal continuity from a minimum number of health professionals, caring relationships between patients and professionals, and well-coordinated care between professionals. An evaluation of Advanced Access as a case study is used to illustrate how researchers need to make several value judgements in operationalising longitudinal continuity. These include whether continuity should be measured from the perspective of patient, doctor, or healthcare system, the types of professionals and consultations that should be considered, the time period to be assessed, the measure to be used, and also practical considerations about data collection. It is argued that decisions about these issues should be based on an underlying hypothesis about why continuity may be important in the particular context. Distinguishing between longitudinal continuity, patient-professional relationships, and coordinated care makes it possible to examine interactions between these different concepts, and to examine relationships with outcomes such as patient satisfaction and quality of care. It will also give greater clarity to debates about whether new models of primary care reduce continuity.

## Keywords

continuity of patient care; family practice; outcome and process assessment (health care); primary health care.

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## INTRODUCTION

Over the last 5 years there has been renewed interest in the concept of continuity of care, in both in the UK and the US.<sup>1–4</sup> This is probably a reflection of recent changes in healthcare organisation in both countries, which have reduced the likelihood of patients seeing the same health professional at repeated visits. In the UK, these changes include the introduction of a wider range of types of primary care provider, the greater involvement of nurses, the promotion of primary care specialist roles for both doctors and nurses, the increasing proportion of health professionals working part-time, and the separation of daytime and out-of-hours primary care.

Although continuity of care is a core component in many international definitions of primary health care, the concept has been criticised as hard to define, and evidence about its benefits is equivocal.<sup>1,3</sup> Several reviews of the evidence about the relationship between continuity of care and outcomes have been published.<sup>1,5–11</sup> There is clear evidence that continuity of care is related to increased patient satisfaction,<sup>10</sup> and some evidence of association with aspects of healthcare utilisation,<sup>10–12</sup> but relationships with quality of technical care and with health outcomes are more uncertain.<sup>8,10,11</sup> In addition, it has become increasingly clear that, although continuity is a high priority for many patients, its importance varies for different groups of patients with different types of health problems<sup>9,13</sup> and, in some situations, convenience and speed of access may be higher priorities.<sup>13,14</sup>

It is important to assess the impact of changes in primary care organisation on continuity, given its value to many patients and to doctors. However, researchers attempting to operationalise and measure continuity face a minefield of conceptual and practical problems. This article describes these problems and how they can be addressed, using an evaluation of Advanced Access appointment systems as a case study.

## CONCEPTUALISATION AND MEASUREMENT

### *Conceptual meaning of continuity*

The earliest attempts to operationalise continuity of care were based on assessing the proportion of

consultations with a given doctor.<sup>15</sup> However, several authors have pointed out that the term 'continuity' has been used in a variety of ways, and have proposed a range of frameworks and terminologies to disentangle the various ideas involved.<sup>1,6,16-21</sup> These include:

- care from as few professionals as possible;
- continuity of information shared between professionals ('information continuity');
- good communication across a team of professionals or services ('team continuity');
- a consistent approach to the management of a patient from all those involved ('management continuity'); and
- an ongoing therapeutic relationship between a patient and their healthcare providers ('relational continuity').

Some authors view these ideas as hierarchical, from continuity of information to an ongoing relationship.<sup>1,20</sup> The model that is probably most widely cited is described by Haggerty *et al* and refers to informational, management, and relational continuity.<sup>1</sup> Gulliford *et al* argue that these concepts overlap and can be summarised in terms of a 'continuous caring relationship' with an identified health professional and 'seamless care', which involves integration, coordination, and shared information between providers.<sup>3</sup>

However, continuous care between a doctor and a patient does not necessarily lead to a caring relationship. It is important to distinguish between the objective fact of repeated consultations with the same doctor and the subjective experience of a caring relationship between patient and doctor.<sup>13</sup> This article proposes a model (Figure 1) in which repeated consultations over time with as few doctors as possible (labelled 'longitudinal continuity') may lead to a caring relationship between the health professional and patient (labelled 'patient-professional relationship'). Seamless care between professionals and provider organisations — which encompasses what others have described as 'informational continuity', 'team continuity' and 'management continuity' — should be labelled 'coordinated care'. These three concepts of longitudinal continuity, relationship, and coordination are related but distinct, and should be measured separately. By restricting the use of the term 'continuity' to its original meaning of longitudinal care over time, this terminology avoids the potential for confusion generated by frameworks, such as that proposed by Haggerty *et al*,<sup>1</sup> which use the term 'continuity' to describe all of these different concepts. The remainder of this discussion focuses on longitudinal continuity.

## How this fits in

Changes in health service organisation are likely to have a substantial impact on continuity of patient care. It is important to measure continuity of care because it is valued by patients and may have an impact on healthcare utilisation. It is also necessary to have a theoretical framework for how, and why, continuity may be important — this will determine how it should be measured. Maximising longitudinal continuity of care from a small number of health professionals may promote therapeutic relationships. These concepts are distinct from coordinated, seamless care. Continuity, relationships, and coordination should be measured separately.

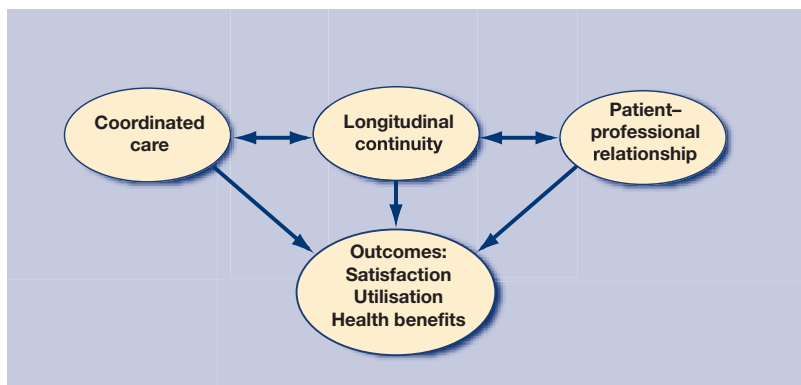
### Whose perspective?

Different conceptualisations of continuity determine whether they should be measured from the perspective of the patient, the doctor, or the healthcare system. The value of continuity to patients appears to come from it promoting a sense of being cared for, being understood, and having trust in their doctor.<sup>13</sup> As the importance of this differs for various patients at different times and for different problems, it is necessary to assess the achievement of continuity from the patients' perspective. Few researchers have attempted to do this.<sup>3,22,23</sup>

However, others have argued that the importance of continuity stems partly from the sense of responsibility that it engenders in doctors.<sup>18,24,25</sup> This may be relevant even in situations when continuity is less important to individual patients, so it may be equally appropriate to assess whether doctors feel they are able to provide continuity.

At a system level, different models of organisation can make it more or less likely that patients will see the same health professional repeatedly. This may be important in terms of outcomes such as efficiency and quality of technical care, as well as patient satisfaction. It is relevant, therefore, to compare longitudinal continuity at a system level by assessing the distribution of consultations between health professionals.

Figure 1. Conceptual model for relationship between continuity and outcomes.



### **Which consultations?**

Measures of longitudinal continuity are based on the pattern of consultations with different health professionals. But which consultations should be included in the denominator for these assessments? Is it equally important that patients consult the same health professional in different settings, such as in a surgery, at a home visit, or in a telephone consultation, or at different times, such as in the day or outside surgery hours? Similarly, it is necessary to decide whether email consultations, consultations in chronic disease management or health-promotion clinics, and urgent daytime consultations with a duty doctor are included in the assessment of continuity.

### **Which professionals?**

Patients may now encounter an increasing range of professionals providing care in general practice, including nurses, healthcare assistants, counsellors, physiotherapists, health visitors, and midwives. The range of staff and the type of work undertaken varies in different practices.

If consultations with all professionals in a practice are included in the assessment of continuity, levels achieved will be substantially lower than if only consultations with doctors are included. However, some of these staff, particularly practice nurses and nurse practitioners, directly substitute for work previously done by doctors. Practice systems may mean that patients have little choice about consulting a nurse instead of a doctor. Estimations of longitudinal continuity that exclude nurses and nurse practitioners from the denominator may overestimate the levels of continuity experienced by patients. But estimates that include nurse consultations may not take account of the fact that care provided by nurses in some practices may be provided in other ways at other practices.

### **Which time period and which patients?**

To estimate longitudinal continuity it is necessary to define a period within which consultations are to be included (the measurement period). As it is only possible to calculate a continuity score for people who have more than one consultation in the measurement period, if this period is short many people will not contribute data. If the period is long, it is difficult to detect the impact on continuity of changes in service provision and there are practical difficulties because of the large amount of data to be collected.

### **Which measure?**

Numerous measures of longitudinal continuity of care have been developed, which have been comprehensively reviewed elsewhere.<sup>20,26-28</sup> Broadly, they can be characterised as measures of:

- concentration (the proportion of consultations with one specific provider);
- dispersion (the number of different professionals consulted);
- distribution (the distribution of consultations between providers, giving higher scores to people who consult fewer providers); or
- sequence (whether each consultation was with the same provider as the previous consultation).

In addition, some measures are based on attributing scores for individuals ('individual measures'), while others attribute a score to each consultation ('visit measures'). Fortunately, empirical studies have shown that, at an organisational level, these different measures tend to give results that are highly correlated.<sup>29,30</sup> However, they do have different mathematical properties that can be important in some situations. In particular, continuity scores using some measures will tend to be inversely related to consultation rate, while other measures make adjustment for utilisation level.<sup>29,30</sup>

### **How should data be collected?**

Measures of longitudinal continuity of care are based on records of consultations over a defined period of time. Given that it is usually necessary to include consultations over an extended period of several years, the data collected will normally be based on routine records. Most general practices in the UK collect consultation data on computers, and their recording systems are likely to have changed over the period of interest. In addition, different practices have different computer systems and, even those with the same system, use it in different ways. Some practices record all consultations on computer, including telephone calls, while others only record certain types of consultation. Consultations conducted by doctors and nurses may be recorded in the same system in some practices, but in different systems in other practices. Although all computer systems have an identifier for the person who undertook the consultation, this can be misleading if practices use shared log-in details, particularly for doctors employed as locums.

There are numerous other pitfalls in analysing computerised consultation data, due to the idiosyncratic ways in which different general practices use their computer systems. Although the most efficient way to estimate continuity scores is to collect the records of a large number of patients and consultations by extracting data from practice computer systems, it is important to be aware of the potential unreliability of the data obtained. Some authors have asked patients about their recent consultations,<sup>31</sup> but it is questionable whether patients can reliably remember when and whom

they consulted over a period of time.

Estimates of longitudinal continuity based on practice records do not take account of the fact that continuity of care with the same professional is more important to some patients than others. An alternative approach to data collection that addresses this problem is to ask patients using a survey whether longitudinal continuity is important to them in a given consultation, and whether they were able to achieve it to see the professional they preferred. This approach has disadvantages of its own.

Postal surveys sent to a random sample of patients are likely to generate a low response rate, and are inefficient because they will include many people who have not had repeated consultations in the recent past and, hence, cannot contribute useful data. Surveys conducted at the time of consultation generally provide higher response rates, but will tend to over-represent patients who consult more often and who may place greater priority on continuity. However, it may be appropriate that patients' assessments of health-system performance in areas such as continuity are weighted in relation to service utilisation.

The discussion so far has demonstrated the wide range of conceptual and practical issues that needs to be addressed to assess the impact of an intervention on continuity of care. The approach that is taken should be based on a clearly articulated theory of how the intervention is intended to have an impact on continuity, and what is meant by continuity in the particular study.

As an example, it may be hypothesised that a 'personal list' system, in which patients in a general practice are expected to see the same doctor at each consultation, will lead to greater longitudinal continuity, and that this in turn will lead to a stronger relationship between the patients and their doctors, and better quality of care. In this example it would be important to assess separately the proportion of all consultations with the same doctor, the strength of the doctor-patient relationship, and quality of care (accepting the difficulty of measuring the last two concepts).

Alternatively, it might be proposed that the main purpose of promoting continuity is to increase patient satisfaction, and that an appointment system that allows people to see doctors of their choice will increase continuity when it matters to patients. In this example, it would be important to measure patients' perceptions of experienced continuity and their level of satisfaction.

The following case study illustrates how an attempt was made to address these problems of conceptualisation and measurement of continuity, as previously discussed, within an evaluation of the Advanced Access initiative.

## CASE STUDY: THE IMPACT OF ADVANCED ACCESS ON CONTINUITY OF CARE

### Background

Advanced Access is an approach to improving access to general practice, in which the aim is to see patients on the day of their choice. Critics of Advanced Access expressed concern that the emphasis on improving access would reduce continuity.

A controlled before-and-after evaluation was conducted comparing 24 practices that implemented Advanced Access, and 23 control practices, matched by list size, that did not. This evaluation used a range of methods to explore the process of implementation and the impact of Advanced Access, as described elsewhere.<sup>14,32</sup> One component of the evaluation was assessment of the impact on longitudinal continuity of care.

### Method

*Perspective.* Longitudinal continuity of care was assessed from two perspectives:

- using objective measurement of continuity based on routine consultation records; and
- by eliciting patients' preferences as part of a patient survey.

*Data collection and measurement period.* Data were collected about consultations from 1 January 2002, or from a year before the practice introduced Advanced Access if this was earlier. Data were collected over the same period for each Advanced Access and matched control practice. A random sample of patients was selected in each practice. Data were collected from computerised and manual records about all consultations within the measurement period.

*Choice of measure.* Longitudinal continuity was analysed using the continuity of care (COC) index.<sup>15</sup> This is an individual-based measure that takes account of the proportion of consultations with the same doctor, adjusted for the number of consultations. This measure was selected because it is independent of practice size or patient consultation rate and avoids the undesirable mathematical properties exhibited by some alternative measures. In addition, it has been used more widely than other measures, which would allow comparison of the results with previous studies. The main disadvantage of the COC index is that the scores it provides do not have an intuitive meaning, apart from at the extremes of 0 (different doctors on every occasion) and 1 (all care from same doctor). Therefore, the usual provider of care (UPC) index was

also calculated, which is easily interpreted as the proportion of consultations that were conducted by the professional consulted most frequently.

*Types of consultation and health professional included.* The study's main underlying hypothesis was that continuity is most important in face-to-face consultations with doctors. Continuity of provider for telephone consultations may be less important because these are often used to assess the need for a face-to-face appointment or to provide a simple function, such as discussing a repeat prescription.

The role of nurses in current UK general practice, which is often based on chronic disease management in clinics or providing practical treatments, such as immunisations and blood tests, may mean that it is more appropriate for patients to see different professionals for these consultations. However, it is recognised that these are all value judgements. Others may argue that organisational changes that encourage the involvement of a wider range of professionals or segment care into different clinics may reduce continuity of care in ways that may, themselves, be important. This further highlights the importance of a clear underlying hypothesis for how and why continuity may be important, in order to decide on the approach to measurement.

It was determined *a priori* that the study's primary analysis would be of continuity (using the COC index) within face-to-face consultations with doctors. As a secondary analysis, continuity of care was also estimated, including all appointment types and practice-based nurses as well as doctors. Consultations with other staff, such as health visitors, community nurses, and counsellors, were excluded.

*Patient survey.* A questionnaire survey of patients consulting a doctor or nurse practitioner at the 47 participating practices over several consecutive days was undertaken. Details of the main results from this

survey have been published elsewhere.<sup>14</sup> Several questions in the survey related to continuity of care.

One question asked responders about the importance to them of various factors when they made their current appointment, including being seen as soon as possible, being seen at a convenient time, seeing a doctor rather than a nurse, and being able to see a particular doctor or nurse. Patients were then asked corresponding questions about whether they achieved the type of appointment that they wished on the current occasion, for example whether they were seen as quickly as they would have liked, or by the doctor or nurse that they wanted to see. Further questions asked patients how often they saw their usual doctor and how satisfied they were with this.

## Results

A total of 114 675 consultations from 47 practices were extracted from medical records, of which 111 570 (97.3%) could be attributed to an identifiable health professional. Table 1 shows the findings using the COC and UPC continuity indices. There was no evidence of any difference between Advanced Access and control practices in longitudinal continuity of care following Advanced Access, either with doctors or overall.

In the patient survey, 10 821 responses were received from 12 825 patients (84.4% response rate). Of 9948 patients responding to the question about the importance of seeing a particular doctor or nurse, 3518 (35.4%) described this as very important, 2549 (25.6%) described it as important, 2270 (22.8%) as not very important, and 1611 (16.2%) as not at all important.

Patients in Advanced Access practices were no more or less likely to obtain an appointment with the professional they wanted to see than those in control practices (84.4% [3486/4128] versus 83.0% [2724/3281], adjusted odds ratio [OR] = 1.16 [0.83 to

**Table 1. Longitudinal continuity of care in Advanced Access and control practices.**

Continuity	Advanced Access, mean (SD)		Control, mean (SD)		Crude difference	Adjusted difference <sup>a</sup> (95% CI)	Adjusted P-value <sup>a</sup>
	Before	After	Before	After			
COC (GPs in surgery)	0.43 (0.36)	0.40 (0.35)	0.43 (0.35)	0.46 (0.34)	-0.06	0.003 (-0.07 to 0.07)	0.93
COC (doctors and nurses, all types consultations)	0.32 (0.31)	0.28 (0.27)	0.32 (0.30)	0.34 (0.30)	-0.06	0.006 (-0.07 to 0.08)	0.88
UPC (GPs in surgery)	0.68 (0.25)	0.64 (0.26)	0.67 (0.25)	0.68 (0.24)	-0.04	0.003 (-0.05 to 0.06)	0.89
UPC (doctors and nurses, all types consultations)	0.56 (0.23)	0.50 (0.22)	0.55 (0.23)	0.54 (0.23)	-0.04	0.009 (-0.05 to 0.07)	0.77

<sup>a</sup>Adjusted for pre-Advanced Access continuity scores, patient age and sex, and practice-list size, training, personal medical services (PMS) and ex-fundholding status. All analyses take appropriate account of clustered nature of data. COC = continuity of care. SD = standard deviation. UPC = usual provider of care.

1.62]). Of the 3518 patients who stated that this was very important to them, 1680 of the 1971 in Advanced Access practices (85.2%) and 1291 of the 1547 in control practices (83.5%) were able to see the doctor or nurse that they wished.

There were no significant differences between the types of practice in terms of peoples' experience of being able to see their usual doctor (Appendix 1) or how satisfied they were with this (Appendix 2).

## CONCLUSIONS

The main implication of this article is that the definition and measurement of continuity of care should be driven by the underlying hypotheses about how, and why, continuity is of value. A framework has been proposed for conceptualising continuity, in which maximising longitudinal continuity of care from a small number of health professionals may promote therapeutic relationships. These concepts are distinct from coordinated seamless care between different professionals and teams.

It is important to distinguish between the three separate (although related) concepts and measure them separately because this makes it possible to examine interesting questions about the relationships between them, and how they each relate to outcomes. For example, it would be interesting to explore the level of longitudinal continuity that is necessary to develop a meaningful doctor-patient relationship, and whether well-coordinated care from a team of health professionals who share information can be an effective substitute for a therapeutic caring relationship with a known professional.

The case study of the evaluation of Advanced Access, discussed here, was based on specifically assessing longitudinal continuity. It demonstrates that there are a number of decisions to be made in operationalising continuity, and that this involves a number of value judgements. Assuming that patients are not expected to discuss all of their problems, in all situations, with the same doctor, it is necessary to make these value judgements according to when it is believed that continuity is important and why.

Several other lessons can be drawn from the case study. Major difficulties were encountered in measuring longitudinal continuity due to differences in how data are recorded in individual practices. Additionally, calculating continuity indices using routine records requires considerable resources and skills in data extraction and manipulation.

Despite the considerable debate about the merits of competing measures of longitudinal continuity, the pattern of results was very similar with two different, widely used, measures. The UPC is easier to understand and its mathematical disadvantages are probably unimportant in studies with large

samples. Perhaps unsurprisingly, continuity of care overall was considerably lower when all types of consultations and professionals were included, rather than just consultations with doctors. This illustrates the reduction of continuity that is likely to occur as an increasingly wide proportion of professionals work within primary care.

With regard to the patient survey, only 61.0% of patients thought it was important to them to see a particular doctor or nurse at their consultation on the day they were surveyed. This highlights the potential benefits of asking patients to assess whether they are able to see a health professional of their choice when they feel they need to. If it is believed that a patient's experience of continuity is the most important factor, because this is likely to promote doctor-patient relationships and patient satisfaction, then a subjective patient measure of this type is best.

It can be argued, however, that longitudinal continuity might be important for reasons that patients may not appreciate. For example, greater continuity may help doctors to be more efficient, or to make better judgements about treatment. In this case, an objective system-level measurement, such as the COC index, is more appropriate. Both approaches were used in the Advanced Access evaluation and they produced similar findings.

Measurement of longitudinal continuity in isolation is relatively meaningless, unless it is related to measurement of other important related concepts. These may include patient satisfaction and coordination of care, but also other aspects of health service performance that can be traded off against continuity, such as accessibility and quality of technical care. It should not be assumed that continuity of care is necessarily a good thing. In some circumstances it could be associated with services that are inaccessible and inflexible, and poorer health outcomes due to missed opportunities for referral to a more appropriate professional. Similarly, a positive patient experience of continuity of care may not necessarily be associated with good technical quality of care or with positive health outcomes.

Changes in health-service organisation are likely to continue to have a substantial impact on continuity of patient care.<sup>4</sup> It is important to measure continuity of care because it is valued by patients and may have an impact on healthcare utilisation, as well as other outcomes. In seeking to measure continuity, researchers need to take full account of both the conceptual and methodological issues discussed here.

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Thames Valley Multicentre Research Ethics Committee (MREC reference: 04/12/024)

#### Competing interests

The authors have stated that there are none

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#### REFERENCES

- Haggerty JL, Reid RJ, Freeman GK, *et al.* Continuity of care: a multidisciplinary review. *BMJ* 2003; **327**(7425): 1219–1221.
- Turner D, Tarrant C, Windridge K, *et al.* Do patients value continuity of care in general practice? An investigation using stated preference discrete choice experiments. *J Health Serv Res Policy* 2007; **12**(3): 132–137.
- Gulliford M, Naithani S, Morgan M. What is 'continuity of care'? *J Health Serv Res Policy* 2006; **11**(4): 248–250.
- Guthrie B, Saultz JW, Freeman GK, Haggerty JL. Continuity of care matters. *BMJ* 2008; **337**: a867.
- Wall EM. Continuity of care and family medicine: definition, determinants, and relationship to outcome. *J Fam Pract* 1981; **13**(5): 655–664.
- Freeman G, Shepperd S, Robinson I, *et al.* *Continuity of care: report of a scoping exercise for the SDO programme of NHS R&D*. London: NCCSDO, 2000.
- Gray DP, Evans P, Sweeney K, *et al.* Towards a theory of continuity of care. *J R Soc Med* 2003; **96**(4): 160–166.
- Cabana MD, Jee SH. Does continuity of care improve patient outcomes? *J Fam Pract* 2004; **53**(12): 974–980.
- Nutting PA, Goodwin MA, Flocke SA, *et al.* Continuity of primary care: to whom does it matter and when? *Ann Fam Med* 2003; **1**(3): 149–155.
- Saultz JW, Albedaiwi W. Interpersonal continuity of care and patient satisfaction: a critical review. *Ann Fam Med* 2004; **2**(5): 445–451.
- Saultz JW, Lochner J. Interpersonal continuity of care and care outcomes: a critical review. *Ann Fam Med* 2005; **3**(2): 159–166.
- De Maeseneer JM, De Prins L, Gosset C, Heyerick J. Provider continuity in family medicine: does it make a difference for total health care costs? *Ann Fam Med* 2003; **1**(3): 144–148.
- Tarrant C, Windridge K, Boulton M, *et al.* How important is personal care in general practice? *BMJ* 2003; **326**(7402): 1310.
- Salisbury C, Goodall S, Montgomery AA, *et al.* Does Advanced Access improve access to primary health care? Questionnaire survey of patients. *Br J Gen Pract* 2007; **57**(541): 615–621.
- Bice TW, Boxerman SB. A quantitative measure of continuity of care. *Med Care* 1977; **15**(4): 347–349.
- Shortell SM. Continuity of medical care: conceptualization and measurement. *Med Care* 1976; **14**(5): 377–391.
- Hennen BK. Continuity of care in family practice. Part 1: dimensions of continuity. *J Fam Pract* 1975; **2**(5): 371–372.
- Rogers J, Curtis P. The concept and measurement of continuity in primary care. *Am J Public Health* 1980; **70**(2): 122–127.
- Starfield B. Continuous confusion? *Am J Public Health* 1980; **70**(2): 117–119.
- Saultz JW. Defining and measuring interpersonal continuity of care. *Ann Fam Med* 2003; **1**(3): 134–143.
- Freeman GK, Olesen F, Hjortdahl P. Continuity of care: an essential element of modern general practice? *Fam Pract* 2003; **20**(6): 623–627.
- Gulliford MC, Naithani S, Morgan M. Measuring continuity of care in diabetes mellitus: an experience-based measure. *Ann Fam Med* 2006; **4**(6): 548–555.
- King M, Jones L, Richardson A, *et al.* The relationship between patients' experiences of continuity of cancer care and health outcomes: a mixed methods study. *Br J Cancer* 2008; **98**(3): 529–536.
- McWhinney IR. Continuity of care in family practice. Part 2: implications of continuity. *J Fam Pract* 1975; **2**(5): 373–374.
- Ridd M, Shaw A, Salisbury C. 'Two sides of the coin' — the value of personal continuity to GPs: a qualitative interview study. *Fam Pract* 2006; **23**(4): 461–468.
- Steinwachs DM. Measuring provider continuity in ambulatory care: an assessment of alternative approaches. *Med Care* 1979; **17**(6): 551–565.
- Eriksson EA, Mattsson LG. Quantitative measurement of continuity of care. Measures in use and an alternative approach. *Med Care* 1983; **21**(9): 858–875.
- Jee SH, Cabana MD. Indices for continuity of care: a systematic review of the literature. *Med Care Res Rev* 2006; **63**(2): 158–188.
- Smedby O, Eklund G, Eriksson EA, Smedby B. Measures of continuity of care. A register-based correlation study. *Med Care* 1986; **24**(6): 511–518.
- Given CW, Branson M, Zemach R. Evaluation and application of continuity measures in primary care settings. *J Community Health* 1985; **10**(1): 22–41.
- Mainous AG III, Baker R, Lovell MM, *et al.* Continuity of care and trust in one's physician: evidence from primary care in the United States and the United Kingdom. *Fam Med* 2001; **33**: 22–27.
- Salisbury C, Montgomery AA, Simons L, *et al.* Impact of Advanced Access on access, workload, and continuity: controlled before-and-after and simulated-patient study. *Br J Gen Pract* 2007; **57**(541): 608–614.

### Appendix 1. Patients in Advanced Access and control practices' response to question: 'In general, how often do you see your usual doctor?'.<sup>a</sup>

	Using Advanced Access?		Total
	Advanced Access <i>n</i> = 5173, <i>n</i> (%)	Control <i>n</i> = 4344, <i>n</i> (%)	Total <i>n</i> = 9517, <i>n</i> (%)
Always	924 (17.9)	694 (16.0)	1618 (17.0)
Almost always	1884 (36.4)	1436 (33.1)	3320 (34.9)
A lot of the time	820 (15.9)	787 (18.1)	1607 (16.9)
Some of the time	1104 (21.3)	1026 (23.6)	2130 (22.4)
Almost never	380 (7.3)	347 (8.0)	727 (7.6)
Never	61 (1.2)	54 (1.2)	115 (1.2)

<sup>a</sup>Ordinal regression for difference between Advanced Access and control practices: adjusted odds ratio 1.20 (95% CI = 0.91 to 1.57).

### Appendix 2. Rating of ability to see usual doctor.<sup>a</sup>

How do you rate this?	Using Advanced Access?		Total
	Advanced Access <i>n</i> = 5043, <i>n</i> (%)	Control <i>n</i> = 4254, <i>n</i> (%)	Total <i>n</i> = 9297, <i>n</i> (%)
Very poor	51 (1.0)	47 (1.1)	98 (1.1)
Poor	236 (4.7)	196 (4.6)	432 (4.6)
Fair	792 (15.7)	783 (18.4)	1575 (16.9)
Good	1460 (29.0)	1374 (32.3)	2834 (30.5)
Very good	1501 (29.8)	1099 (25.8)	2600 (28.0)
Excellent	1003 (19.9)	755 (17.7)	1758 (18.9)

<sup>a</sup>Ordinal regression for difference between Advanced Access and control practices: adjusted odds ratio 1.25 (95% CI = 0.96 to 1.62).