Consultation length by multimorbidity and deprivation: observational study using electronic patient records

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Abstract

Background: Longer GP consultations are recommended for people with multimorbidity. In Scotland, multimorbid patients in deprived areas did not have longer consultations though their counterparts in the least deprived areas did. We are not aware of research testing this particular example of the inverse care law in England.

Aim: To assess length of GP consultation for patients with and without multimorbidity and whether this varies by socioeconomic deprivation.

Design and Setting: Random sample of over 1.2 million consultations between 1st April 2014 and 31st March 2016 for 185,755 adults in England drawn from the Clinical Practice Research Datalink.

Method: Consultation duration was derived from time of opening and closing the patient’s electronic record. Duration was modelled as a function of multimorbidity status, index of multiple deprivation, and their interaction, with adjustment for age, sex, GP trainee status and patient level random effect.

Results: Mean adjusted consultation length in the most deprived fifth of areas was 10.8 (95% CI 10.7,10.9) minutes for people with 2+ physical conditions and 11.0 (95% CI 10.9,11.1) minutes for people with 2+ conditions including a mental health condition. This compares with 11.0 (95% CI 10.9,11.0) minutes for non-multimorbid people in the least deprived fifth of areas.

Conclusion: Consultation length for people with multimorbidity in the most deprived areas is no higher than that for non-multimorbid people in the least deprived areas. Further research is needed to assess the impact of consultation length on patient and system outcomes for people with multimorbidity.

NOTE: This preprint reports new research that has not been certified by peer review and should not be used to guide clinical practice.
Introduction

Multimorbidity is defined as the co-existence of two or more conditions within an individual. Prevalence estimates depend on the conditions counted but recent studies suggest around 23-27% in the general, all age population (1, 2) -- an estimated 14.2 million people in England (3) -- are affected and prevalence is increasing across the UK (4). Multimorbidity risk increases with advancing age and is strongly linked to socioeconomic position, occurring more frequently and 10-15 years earlier in the most compared with least deprived areas (2). Living with multimorbidity can be challenging and may result in poor quality of life and difficulties with everyday activities (5, 6). People with multimorbidity often require significant time and interaction with health services. Providing care to these individuals can be challenging due to the complexity of intersecting, and sometimes contradictory, health and care requirements (7). In addition, around 30% of multimorbid people have both physical and mental health conditions, rising to over 40% in the most deprived fifth of areas (2). People with comorbid physical and mental conditions have more complex care needs and can find it more difficult to manage their conditions (8).

Compared with people who are not multimorbid, people with multimorbidity require more input from the healthcare system. They require a higher number of GP consultations and have an increased likelihood of an emergency admission to hospital (1, 9). There is however, some evidence that if a person is more able to manage their multiple health conditions independently, they have fewer emergency admissions (9, 10). One study in an area of high deprivation showed that more time for complex consultations is associated with increased patient enablement, i.e. ability to self-manage conditions (11). The Royal College of GPs, based on this premise, recommend longer consultations for patients with multimorbidity in order to reduce burden on the rest of the NHS (12). People living with multimorbidity, likewise, have identified longer primary care appointments as an optimal way of improving the quality of their care (13).

Despite these recommendations, research in Scotland has shown that the greater need of patients with multimorbidity living in the most deprived quarter of areas is not reflected in longer consultation length. This is in contrast to the least deprived quarter of areas where those with multimorbidity received longer consultations than those without (14). This is an example of the inverse care law, where the availability of good medical care tends to vary inversely with need. We are not aware of any research examining whether this particular example of the inverse care law also applies in England, though consultation length has been found to be shorter in more deprived areas (15).

We studied the association between GP consultation length and presence of multimorbidity or socioeconomic deprivation in England. We tested whether the difference in consultation length for patients with and without multimorbidity varied between more and less deprived areas in England. We also assessed whether these factors were affected by multimorbidity type.

Methods

Data were obtained from the Clinical Practice Research Datalink (CPRD), a research database of anonymised patient records covering approximately 6.9% of the UK population (16). Our dataset consisted of a random sample of n=300,000 people in England eligible for linkage to an area-based measure of socioeconomic deprivation and registered between 1st April 2014 and 31st March 2016 (or who died during this period) in an Up-To-Standard practice (i.e. a quality indicator based on continuous recording of patient data and
completeness of recorded deaths). We included consultations over this two-year follow-up period. For this study, we excluded those aged under 18 years.

Consultation duration:
Consultation duration was captured in whole minutes and derived from the opening and closing time for a patient’s electronic patient record. We analysed only face-to-face consultations with a GP or GP registrar. We excluded consultations where the record was opened for administrative purposes, telephone consultations (due to the large number which may be triage appointments followed by face-to-face consultations), and home visit consultations (as the recorded duration would only represent the time taken to record the consultation after it has ended). Consultations recorded as lasting over 60 minutes were truncated at 60 mins as these were considered unlikely to reflect actual consultation length (17).

Multimorbidity status:
We derived the presence or absence of 36 conditions at the start of follow-up on April 1st 2014. These 36 conditions were identified in previous work because they are likely to be chronic, related to reduced quality of life and mortality risk, and with substantial need for ongoing treatment (1) and used publicly available lists (18) for Read codes (i.e. codes used by UK primary care practitioners to record information about diagnoses) and product codes (i.e. codes specific to CPRD to record information about pharmacological and non-pharmacological products). Patients with zero or one condition were classified as “not multimorbid”. Those with two or more of these conditions were classified as “multimorbid”. We additionally separated multimorbid patients into those that had at least one mental health condition (depression or anxiety, anorexia or bulimia, alcohol problems, other psychoactive substance use, schizophrenia) which we refer to as “multimorbid – including a mental health condition” and those that had only physical health conditions, which we refer to as “multimorbid – physical only”.

Socioeconomic deprivation:
Deprivation was based on the patient’s area of residence (Lower Super Output Area level) using deciles of the 2015 Index of Multiple Deprivation (14), grouped into high deprivation (deciles 1-3), medium deprivation (4-7) or low deprivation (8-10). Linkage was undertaken by CPRD.

Covariates:
GP registrars are GPs in training and are typically allocated longer duration for their consultations, although actual allocated time may vary depending on stage of training. GP registrars may also not be assigned the most complex patients. Women and older people also have longer consultations on average, though the association between duration and age is not linear (15).

Statistical analysis:
We conducted multilevel linear regression analysis with consultation length as the dependent variable and controlled for age, sex, GP trainee status, and number of GP consultations in the two-year follow-up period. Two-level regression models accounted for the non-independence of multiple consultations within patients. In the first model, we included multimorbidity status (in three categories) and area deprivation as exposures of interest (model 1). In the second model, we added the interaction between area deprivation and multimorbidity status (model 2). In supplementary analysis we included crude multimorbidity status (in two categories as multimorbid or not).
Consultation length is not normally distributed but previous studies (15) have analysed it using means and multilevel linear regression models. In sensitivity analysis, we repeated the regression models using multilevel Poisson regression. The direction and statistical significance of the associations of interest were unchanged (results available on request). We therefore present the linear regression results here.

Code for data derivation and analysis is available here.

Results

The original sample of patients aged 18 and over contained data on 2,930,016 consultations. We excluded the following consultations: 375,529 that were not face to face; 1,031,869 that were not with either a GP or GP registrar; 264,243 with duration less than two minutes (as it was deemed these did not reflect accurate consultation). The analytical sample included data on 1,259,375 consultations for 185,755 patients. As a result of these exclusions, a higher percentage of consultations for multimorbid patients were dropped from the analysis.

Fifty-five per cent of the sample were women, 25.9% lived in the least deprived fifth of areas in England, and 35.8% had two or more conditions (Table 1). Twenty-three per cent had two or more physical conditions and 12.6% had multimorbidity that included at least one mental health condition.

Women had longer consultations (11.0 minutes) and more consultations (7.5 over 2 years) than men (10.9 minutes and 6.5 consultations respectively; Table 2). Older people did not have longer consultations, but they had more consultations compared with younger people. Compared with fully qualified GPs, GP registrars had longer consultations with a mean duration of 14.4 minutes. In unadjusted analysis, mean consultation length was shorter for people living in more deprived areas. Shorter consultations were also seen for patients that were not multimorbid (10.8 minutes compared with 11.0 for multimorbid patients). Among multimorbid patients, those with at least one mental health condition had mean consultation time of 11.1 minutes and those with only physical health conditions 10.9 minutes.

Table 3 summarises estimates from the regression models. Controlling for multimorbidity status, sex, age, GP trainee status and number of consultations, residence in a more deprived area was associated with a shorter consultation. Mean duration was 0.50 (95% CI 0.44, 0.56) minutes shorter for those in the most compared with the least deprived fifth of areas (Table 3, model 1).

Controlling for deprivation, sex, age, GP trainee status and number of consultations, mean duration was 0.37 (95% CI 0.32,0.41) minutes longer for multimorbid people than for those who were not multimorbid (Supplementary Table 1). Using more detailed multimorbidity status (Table 3, model 1), people with physical multimorbidity had 0.28 minutes longer consultation time and those with multimorbidity that included a mental health condition had 0.49 minutes longer for their consultation compared with non-multimorbid people. This model assumes that the association between consultation length and multimorbidity is not modified by deprivation.

However, there is some evidence that the association between multimorbidity status and consultation duration depended on level of deprivation in the area (p=0.053, Table 3, model 2). The additional consultation time for those with multimorbidity which included a mental health condition in a more deprived area was not as great as for their counterparts in the least deprived fifth of areas. This difference was seen only in the second and third most
deprived quintiles (Figure 1). Figure 1 also illustrates that consultations in the most deprived fifth of areas for people with two or more physical conditions were shorter (10.8 (95% CI 10.7,10.9) minutes) than consultations for non-multimorbid people in the least deprived fifth of areas (11.0 (95% CI 10.9,11.0) minutes). The latter consultation length was the same as that for multimorbid people with at least one mental health condition living in the most deprived fifth of areas (11.0 (95% CI 10.9,11.1) minutes).

Discussion

Summary

Living in an area of high socioeconomic deprivation is associated with shorter GP consultations. Managing the care of people with multimorbidity can be complex and so it is reassuring that GP consultations were slightly longer for patients with multimorbidity (especially where this included a mental health condition) than for those with one or no conditions. However, multimorbidity is more common in more deprived areas and the additional consultation time for multimorbid patients did not fully counteract the shorter consultation time for patients in the most deprived fifth of areas. As a result, the consultation length for a multimorbid patient in the most deprived fifth of areas was the same as that for a non-multimorbid patient in the least deprived fifth of areas.

Strengths and limitations

A strength of this study was the large sample size and the number of records included. We also explored the results by type of multimorbidity. The use of multilevel regression analysis in which we controlled for sex, age, GP trainee status and number of consultations adds to the robustness of the findings. This study was limited by several factors. CPRD data provides consultation time based on the open and close time of the electronic record. This is the amount of time a practitioner had the file open, which may be affected by other factors including practitioner preference regarding whether to complete and close a record while the patient is present or later in the day and the possibility of clinicians forgetting to close a consultation until after the care episode has ended (though we capped all consultations at a maximum of 60 minutes). We excluded any very short consultations, and this resulted in exclusion of a greater proportion of consultations with patients with multimorbidity, which may have led to us overestimating mean consultation time for these patients. We were unable to consider the role of GP practice level factors including the level of deprivation of the GP surgery and the staffing level. The staffing level and patient load at a particular GP surgery influences the work pressure for GPs, and therefore can influence the consultation length time available (19). Future analysis should also consider consultations with nurses, since these provide a sizeable proportion of primary care for people with multimorbidity (17).

The adjusted difference in consultation time for patients in the most compared with the least deprived areas amounted to 0.5 minutes. The magnitude of this difference appears small and further work is needed to assess whether consultation length is associated with poor experience, poor outcomes or greater use of other health services, as others have noted (20), but this should be interpreted in the context of an average consultation of only 11 minutes.

Comparison with existing literature
This paper supports evidence that multimorbidity and deprivation influence the consultation time with a GP. Particularly concerning is ongoing evidence indicating that patients in deprived areas have shorter consultation times (15). This is likely to reflect ongoing job pressures for GPs in deprived areas, and a greater need for care among this group of patients (19). We also identify that patients with multimorbidity receive slightly longer consultations. This is in line with calls for longer GP consultations for multimorbid patients, though the actual difference in consultation length was small in magnitude. The suggestion that the association between consultation length and multimorbidity is modified by deprivation level is in line with the findings of Mercer et al. in Scotland (14). Mercer and colleagues used videotaped consultations to provide an accurate measure of time spent with patients. They considered a single consultation for each patient and our study adds to their findings in showing that a similar pattern is seen across multiple consultations over a two-year period of usual care.

Having a mental health condition can make it more difficult to manage complex care needs and longer consultations have been linked to better handling of psychological problems in primary care (21, 22). It is therefore a concern that our findings suggest that the additional consultation time given to multimorbid patients who have a mental health condition may be less in more deprived areas. This analysis warrants replication in other studies as the multimorbidity by deprivation interaction term attained only borderline statistical significance, and additional research is also needed to understand the interaction between mental and physical comorbidities and the demand for health care.

**Implications**

People with multimorbidity are more likely to require GP input than those with a single condition. The inverse care law observes that the availability of good medical care tends to vary inversely with the need for it. The burden of need sits firmly in the most deprived areas of the country yet this is not how care is currently provided and the number of GPs is falling fastest in the most deprived areas of the UK(19).

As the number of full-time-equivalent GPs decreases and GP workload increases, and in the face of an aging population and increasing numbers of people with multimorbidity, we need to ensure that each consultation with a GP achieves the maximum benefit possible, both for the patient and the doctor. This includes heeding calls for patients with multimorbidity to be allocated longer consultation times, whilst also determining the need for this on an individual basis. Although in theory GP practices are free to set their own consultation times, this is currently limited by the increased workload and co-existing workforce crisis. Our findings indicate that GPs are providing longer consultations for their multimorbid patients than for those that do not have multiple conditions in both deprived and less deprived areas, but also indicates that this is not sufficient to counteract the shorter consultations for all patients in deprived areas.

Recruiting additional allied health professionals is seen as one way of freeing up GP time to focus on more complex patients. Initiatives to ensure these additional staff will be distributed equitably across the country or even to attract them to the most deprived areas, such as the current scheme for GPs(23), will be needed. If the additional staff gravitate to areas of lower deprivation, then there will be paradoxically even fewer staff relative to need in the areas of highest deprivation (22).

**Conclusion**

The mean consultation time for people with multimorbidity in the most deprived areas is no higher than that for non-multimorbid people living in the least deprived areas. Continued monitoring of the distribution of the primary care workforce by socioeconomic deprivation...
and how this relates to consultation length for more complex patients will be needed. Further research is also needed to assess the impact of consultation length on patient and system outcomes for people with multimorbidity.

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Competing interests: Authors have no competing interests.

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Table 1. Characteristics of included patients (n=185,755)

|                        | % (N)       |
|------------------------|------------|
| **Sex**                |            |
| Female                 | 55.0 (102,085) |
| Male                   | 45.0 (83,670)  |
| **Age**                |            |
| 18-29y                 | 14.5 (26,899) |
| 30-39y                 | 14.7 (27,273) |
| 40-49y                 | 18.8 (34,886) |
| 50-59y                 | 18.2 (33,170) |
| 60-69y                 | 16.0 (29,697) |
| 70-79y                 | 11.3 (20,940) |
| 80+y                   | 6.7 (12,350)  |
| **Index of Multiple deprivation** |         |
| Quintile 1 (least deprived) | 25.9 (48,090) |
| Q2                     | 21.1 (39,140) |
| Q3                     | 20.3 (37,755) |
| Q4                     | 18.3 (34,060) |
| Q5 (most deprived)     | 14.4 (26,710) |
| **Multimorbidity status** |         |
| Not multimorbid\(^a\)  | 64.2 (119,288) |
| Multimorbid – physical only\(^b\) | 23.2 (43,140) |
| Multimorbid – including a mental health condition\(^c\) | 12.6 (23,327) |

\(^a\)0-1 long-term condition; \(^b\)2+ physical conditions and no mental health conditions; \(^c\)2+ conditions with at least one mental health condition
Table 2. Characteristics of consultations

|                      | Duration (minutes) | Number of consultations over 2 years |
|----------------------|--------------------|--------------------------------------|
|                      | N consultations    | Mean | SD | N patients | Mean | SD |
| Sex                  |                    |      |    |            |      |    |
| Men                  | 492,722            | 10.9 | 7.8| 83,670     | 6.5  | 5.9|
| Women                | 766,653            | 11.0 | 7.8| 102,085    | 7.5  | 7.5|
| Age                  |                    |      |    |            |      |    |
| 18-29y               | 139,815            | 10.6 | 7.4| 26,899     | 5.4  | 5.2|
| 30-39y               | 154,489            | 10.9 | 7.6| 27,273     | 6.0  | 5.7|
| 40-49y               | 204,450            | 11.2 | 7.7| 34,886     | 6.1  | 5.9|
| 50-59y               | 217,014            | 11.1 | 7.6| 33,710     | 6.5  | 6.4|
| 60-69y               | 220,055            | 10.9 | 7.7| 29,697     | 7.2  | 7.4|
| 70-79y               | 192,619            | 10.9 | 7.9| 20,940     | 8.4  | 9.2|
| 80+y                 | 130,933            | 10.7 | 8.9| 12,350     | 10.6 | 10.6|
| GP registrar         |                    |      |    |            |      |    |
| No (Qualified GP)    | 1,150,551          | 10.6 | 7.5| 119,288    | 4.8  | 5.0|
| Yes                  | 108,824            | 14.4 | 9.4| 66,467     | 9.2  | 9.9|
| Index of multiple deprivation |          |      |    |            |      |    |
| Q1 (least deprived) | 318,157            | 11.2 | 7.9| 48,090     | 6.8  | 6.6|
| Q2                   | 258,758            | 11.0 | 7.8| 39,140     | 7.2  | 6.6|
| Q3                   | 258,763            | 10.9 | 7.8| 37,755     | 7.2  | 6.9|
| Q4                   | 236,488            | 10.8 | 7.8| 34,060     | 7.1  | 6.9|
| Q5 (most deprived)  | 187,209            | 10.7 | 7.6| 26,710     | 7.1  | 7.0|
| Multimorbidity status|                    |      |    |            |      |    |
| Not multimorbid      | 599,059            | 10.8 | 7.4| 119,288    | 5.0  | 4.8|
| Multimorbid          | 660,316            | 11.0 | 8.1| 66,467     | 9.9  | 9.2|
| Of which            |                    |      |    |            |      |    |
| Multimorbid – physical only | 397,104 | 10.9 | 7.97| 43,140| 9.21 | 8.24|
| Multimorbid – including a mental health condition | 263,212 | 11.1 | 8.27| 23,327| 11.28 | 10.56|

a0-1 long-term condition; b2+ physical conditions and no mental health conditions; c2+ conditions with at least one mental health condition
### Table 3. Association between consultation duration (minutes) and multimorbidity and area deprivation, adjusted for sex, age, GP trainee status and number of consultations

|                                | Model 1: Deprivation and MM mutually adjusted | Model 2: M1 + interaction of deprivation x MM |
|--------------------------------|-----------------------------------------------|-----------------------------------------------|
|                                | Regression coeff | 95% CI                        | Regression coeff | 95% CI                        |
| **Index of multiple deprivation** |                                |                                |                                |                                |
| Q1 (least deprived)            | Ref               |                                | Ref               |                                |
| Q2                              | -0.23             | (-0.28,-0.17)                 | -0.20             | (-0.28,-0.13)                 |
| Q3                              | -0.30             | (-0.35,-0.24)                 | -0.26             | (-0.34,-0.19)                 |
| Q4                              | -0.42             | (-0.48,-0.37)                 | -0.43             | (-0.50,-0.35)                 |
| Q5 (most deprived)             | -0.50             | (-0.56,-0.44)                 | -0.51             | (-0.55,-0.43)                 |
| **Multimorbidity status**      |                                |                                |                                |                                |
| Not multimorbid\(a\)           | Ref               |                                | Ref               |                                |
| Multimorbid – physical only\(b\) | 0.28             | (0.23,0.33)                   | 0.29             | (0.20,0.38)                   |
| Multimorbid – including a mental health condition\(c\) | 0.49             | (0.43,0.54)                   | 0.55             | (0.43,0.66)                   |
| **Interaction**                |                                |                                |                                |                                |
| Q2 & multimorbid physical only | -0.00             | (-0.13,0.12)                 | -0.00             | (-0.13,0.12)                 |
| Q3 & multimorbid physical only | -0.04             | (-0.16,0.09)                 | -0.04             | (-0.16,0.09)                 |
| Q4 & multimorbid physical only | -0.05             | (-0.17,0.08)                 | -0.05             | (-0.17,0.08)                 |
| Q5 & multimorbid physical only | 0.05              | (-0.10,0.19)                 | 0.05              | (-0.10,0.19)                 |
| Q2 & multimorbid including mental | -0.18            | (-0.34,-0.12)                | -0.18            | (-0.34,-0.12)                |
| Q3 & multimorbid including mental | -0.17            | (-0.33,-0.01)                | -0.17            | (-0.33,-0.01)                |
| Q4 & multimorbid including mental | 0.06             | (-0.11,0.22)                 | 0.06             | (-0.11,0.22)                 |
| Q5 & multimorbid including mental | -0.02            | (-0.19,0.14)                 | -0.02            | (-0.19,0.14)                 |

\(a\)0-1 long-term condition; \(b\)2+ physical conditions and no mental health conditions; \(c\)2+ conditions with at least one mental health condition
Figure 1. Consultation duration by area deprivation (estimates from model 2)

Figure 1 footnote:
“Not multimorbid”: 0-1 long-term condition; “Multimorbid – physical only”: 2+ physical conditions and no mental health conditions; “Multimorbid – including mental health condition”: 2+ conditions with at least one mental health condition
Supplementary Table 1. Association between consultation duration (minutes) and crude multimorbidity status and area deprivation, adjusted for sex, age, GP trainee status and number of consultations

|                        | Model 1: Deprivation and MM mutually adjusted | Model 2: M1 + interaction of deprivation x MM |
|------------------------|-----------------------------------------------|-----------------------------------------------|
|                        | Regression coeff | 95% CI                          | Regression coeff | 95% CI                          |
| **Index of multiple deprivation** |                   |                                 |                   |                                 |
| Q1 (least deprived)    | Ref              |                                 | Ref              |                                 |
| Q2                     | -0.23            | (-0.28, -0.17)                  | -0.20            | (-0.28, -0.13)                  |
| Q3                     | -0.30            | (-0.35, -0.24)                  | -0.26            | (-0.34, -0.19)                  |
| Q4                     | -0.42            | (-0.48, -0.36)                  | -0.43            | (-0.50, -0.35)                  |
| Q5 (most deprived)     | -0.49            | (-0.55, -0.43)                  | -0.51            | (-0.60, -0.43)                  |
| **Crude multimorbidity status** |                   |                                 |                   |                                 |
| Not multimorbid\(^a\)  | Ref              |                                 | Ref              |                                 |
| Multimorbid\(^b\)      | 0.37             | (0.32, 0.41)                    | 0.38             | (0.30, 0.46)                    |
| **Interaction**        |                   |                                 |                   |                                 |
| Q2 & multimorbid       |                   | -0.06                          | (-0.17, 0.06)    |
| Q3 & multimorbid       |                   | -0.07                          | (-0.18, 0.04)    |
| Q4 & multimorbid       |                   | 0.02                           | (-0.10, 0.13)    |
| Q5 & multimorbid       |                   | 0.05                           | (-0.07, 0.17)    |

\(^a\)0-1 long-term condition; \(^b\)2+ long-term conditions