Original article title

A cross-sectional survey of general practice health workers' perceptions of their provision of culturally competent services to ethnic minority people with diabetes

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ABSTRACT

Aims: To explore General Practice teams cultural competence, in particular, ethnicity, linguistic skillset and cultural awareness. The practice teams' access to diabetes training, and overall perception of cultural competence were also assessed.

Methods: A cross-sectional single-city survey with one in three people with diabetes from a minority ethnic groupusing 35 semi-structured questions. Self-reported data analysed using descriptive statistics, interpreted with reference to the Culturally-Competent Assessment Tool.

Results: Thirty-four (52%) of all 66 practices in Coventry responded between November 2011 and January 2012. Key findings: (1) One in five practice staff was from a minority group in contrast with one in ten of Coventry's population, (2) 164 practice staff (32%) spoke a second language relevant to the practice's minority population, (3) 56% of practices were highly culturally-competent at providing diabetes services for minority populations, (4) 94% of practices reported the ethnicity of their populations, and (5) most frequently stated barriers to culturally-competent service delivery were language and knowledge of nutritional habits.

Conclusions: Culturally-competent diabetes care is widespread across the city. Language barriers are being addressed, cultural knowledge of diabetes-related nutrition requires further improvement. Further studies should investigate if structured cultural competence training for diabetes service providers produces positive effects in diabetes-related outcome-measures in minority populations.

Highlights

- 56% GP practices provided highly culturally-competent diabetes services
- 32% City GP staff spoke a second language relevant to the practice's minority population
- GP staff from minority groups were 1:5 compared to 1:10 in the city's population
- 100% GP practice staff received regular formal training on diabetes care
- No GP practice staff received formal/structured cultural competence training.

INTRODUCTION

Diabetes is the fourth most common cause of death globally (1). It is a lifelong disease, with serious health complications (such as blindness, coronary vascular disease, kidney failure, nerve damage, stroke and lower limb amputation) and significantly reduces life expectancy (2). The ageing populations and rising levels of obesity across the world would suggest diabetes is a major challenge in global public health. Ethnic minority groups (population subgroups with an ethnic origin different from that of the majority population of the host country), are susceptible to diabetes due to physiological, environmental and lifestyle factors, insulin resistance and genetic predisposition (3-5) and often experience poorer health outcomes (3, 6, 7). Furthermore, diabetes onset in these groups (especially in those of South Asian and African-Caribbean origins) is 5 to 10 years earlier than in the white Europeans and more often presents with complications, such as cardiovascular disease, at diagnosis, leading to premature mortality (8-11). Ethnic minority groups are highly heterogeneous, and have differing health issues, socioeconomic status, migration history, and religion (12). Interventions to slow down the pace of disease/diabetes progression therefore need to be culturally-and-individually-tailored. Effective therapeutic relationships between diabetes patients and healthcare professionals are difficult to develop when cultural competence (not currently mandatory in UK healthcare training education) is absent (13-17) as an understanding of patients' cultural background can promote provider-patient engagement and facilitate patients' understanding of their diabetes and care management (18-20). Interventions delivered by culturally-and linguistically-competent healthcare workers have been shown to confer important benefits to the person with diabetes and their families and also reduce costs in every nation's healthcare system (21). Well-designed cultural competence training for health workers can improve provider-patient relationships and healthcare provision (22, 23).

Coventry is a medium-sized industrial and ethnically-diverse UK city typical of many cities in the developed world, low literacy and language barriers hamper access to diabetes care for minority populations (26, 27), leading to poorer self-management (15, 28). Two systematic reviews (18, 19) found diabetes outcomes improved when health providers structured diabetes services to include elements of culture, language, religion, and health literacy skills and tailored these services to the individual minority population (19). Incorporating all these four elements improved HbA1C, blood pressure and cholesterol when compared with baseline measures (29-32). Providing culturally-competent healthcare might therefore be a cost-effective approach to reducing health care costs associated with minority populations. In the context of rising international migration, understanding how primary healthcare providers can provide culturally-competent services may support service efficiency. Previous analysis of part of this survey data (33) explored the cultural competence of diabetes services delivered to minority ethnic groups and reported on the general practices' knowledge of their diabetes patients' ethnicity, their knowledge about culturally competent diabetes services provision, and the barriers impeding this provision. The aim of this paper is to look specifically at workforce cultural competence within GP practices in Coventry where one in three people with diabetes is from a minority ethnic group. In particular, we investigated the ethnicity, linguistic skillset and cultural aware of General Practice teams, their access to diabetes training.

RESEARCH METHODS

Survey design

A cross-sectional population survey was used, including a structured survey with five main headings comprising mostly closed questions with some free text areas (see Online Table S1). The survey design was informed by two systematic reviews (18, 19) a 25 question pilot General Practice Survey (13), and survey design methods (34, 35). The pilot survey (13), developed by the first author in consultation with diabetes specialists, patient representatives and a consultant in public health, tested the feasibility

and applicability of questions and methods. The Warwick Diabetes Research & Education User Group, (experienced lay people with diabetes), was consulted and provided feedback on question content. Ethical approval was granted by National Research Ethics Service (NRES) Committee West Midlands-Solihull (Reference Number: 11/WM/0218).

Population and data collection

All 66 Coventry general practices with 361,893 registered patients, including people with diabetes were invited to participate (24), with access facilitated by NHS Coventry (known as Coventry & Rugby clinical commissioning groups since April 2013). A printout of the survey was sent via post to the practice manager and senior GP of each practice, followed by an electronic copy via email, with instructions on how to complete the survey using online SurveyMonkey (cloud-based software). A second mail was posted to non-responding practices four weeks after the initial mailings. Non-respondents received two telephone follow-up calls after the fourth and eighth week of the initial mailings. The study was promoted at three monthly awareness-raising Protected Learning Time meetings, open to all primary healthcare professionals. A £40 incentive was offered to each general practice for every completed survey received within eight weeks and £25 for surveys received between 8 and 12 weeks. A 'thank you letter' was sent to all participants.

Data analysis

For quality assurance, each completed questionnaire was cross checked against the Quality and Outcomes Framework data (24) specific to the respective practices. We also looked at any other publicly available datasets, such as the practice's website. These data sources contained good publicly available information explicitly to each practices, such as the practice size, number of people with diabetes and staffing. All survey data were transcribed into the SurveyMonkey database and

anonymised prior to being imported into Microsoft Excel. Coding was performed by PZ, who also read the free text data arising from the survey several times to formulate the main emerging themes. Missing data (such as missing ethnicity of patients with diabetes, unanswered or incomplete questions), were also noted and confirmed by HS and JS. Descriptive statistical analyses were carried out using Microsoft Excel and SPSS v19. Free text data were analysed using a thematic constant comparative analysis method. Surveys with more than 85% (n>29) of questions incomplete were excluded from the analysis. The 10-item Culturally-Competent Assessment Tool (CCAT) [accompanied by a 6 page guidance notes is a tool designed for testing the cultural competency of healthcare delivery interventions/services] (19) (see Table 1) was used by PZ to systematically assess the cultural competence of diabetes services self-reported by each responding General Practice team and confirmed as so by HS and JS.

Data is presented using standard descriptive analyses. Continuous variables will be summarised using the mean and standard deviation (if symmetrically distributed) and median and inter-quartile range (if skewed). Categorical variables will be presented as counts and percentages. Data will be presented graphically, where appropriate, using bar charts.

Table 1: Culturally-Competent Assessment Tool (CCAT) for Healthcare Interventions in Ethnic Minority Groups by Zeh et al. (2012) used in Table 3 below to denote CCAT Q1, etc.

No.	Assessment Factors for Culturally-Competent level of each practice
(1)	Does the intervention / service have a clear focus on ethnic minority groups?
(2)	Is the intervention / service sensitive to the specific linguistic needs of the participants?
(3)	Do the intervention / service providers demonstrate cultural awareness?
(4)	Do the intervention / service providers have cultural knowledge?
(5)	Do the intervention / service providers have specialist knowledge in the clinical condition?
(6)	Are the linguistic needs of patients or clients met by (a) health workers speaking the patient's/client's main language (b) Health workers speaking the patient's/client's second language? (c) Interpreters? (d) Translators? (e) Audio–visual recorded aids?
(7)	Are the health literacy needs of patients and/or clients met by the delivery health workers or expert patients?
(8)	Are the intervention / service providers culturally-competent in the delivering of the intervention?
(9)	Are the intervention / service providers culturally sensitive?
(10)	Does the intervention / service work?

NOTE: For an intervention / service to be culturally-competent, the answer is 'yes' to number 1 and 2 and at least 6 other questions in 3-10 scoring above (70%)

Scoring classification of the quality of the culturally-competent intervention / service

- Highly culturally-competent intervention / service must answer 'yes' to 90%-100% of the assessment factors or criteria and scored as 'A'
- Moderately culturally-competent intervention / service must answer 'yes' to at least 70%-89% (B)
- Low culturally-competent intervention / service scores less than 70% (C).

RESULTS

Response rate

Thirty-four (52%) general practices returned their survey (completed by either a GP or a practice nurse or a Practice Manager) and are included in the analysis. Seventeen of the 32 practices did not return their survey giving reasons for non-completion of; low staffing level/staff illness and related practice pressures such as preparing for the NHS Quality and Outcomes Framework inspections (n=10), change to a new clinical database system, which requires additional support (n=3), survey not cost-effective (n=2), information not routinely collected (n=2). Three practices had missing data; did not give details of the ethnicity of their ethnic minority patients with diabetes (n=2), and another practice did not specify the type of diabetes for their ethnic minority patients. One participating practice refused the incentive payment because *'the survey was an eye-opener to review their internal practice.*'

Characteristics of participating general practices

There was no major difference in the characteristics between the participating and non-participating practices in terms of number of GPs, diabetes prevalence and practice size (24). For instance, the highest patients-to-GP ratio in all the non-participating practices was 3,191:1 compared to 2,600:1 in the participating practices. The most frequently reported cultural barriers to delivering culturally-competent diabetes services to minority populations were language (n=15), knowledge of nutritional habits (n=19) and cultural differences between minority patients and health care providers (n=20). Individual nurse-patient clinical appointments held in the patient's own language were the most commonly provided indicator of culturally-competent diabetes service (n=26). The use of South Asian link workers who also spoke the patient's own language was the least offered service, available at only two GP practices. Thirty-two (94%) practices reported recording the ethnicity of their patients. No practice reported having no minority patient with diabetes.

Profile of ethnic minority staff employed within GP practices

There were 517 members of staff employed at the 34 practices providing services to 209,149 (representing 58% of the city's total registered patients in all 66 practices), of which only 133 (26%) were full-time employees across the practices. One hundred and nine staff members (21%) were from minority groups and 408 (79%) were white British (Table 2). The median number of minority staff per practice was 2 (IQR=3) compared with 10 (IQR=13) white British.

Six of the 31 practices (P2, P8, P10, P23, P27, P28) that had a minority diabetes lead nurse and/or other minority staff including the use of multilingual link workers delivered highly culturally-competent diabetes services. Practices with minority patients with diabetes (P6, P11, P12, P16, P20), with few or no minority staff attained low CCAT scores (<70%).

Table 2: Details of staffing factors in general practices (n=34)

Staffing	Number	Median	IQR
Total number of staff	517	12.50	10.75
Full time	133	3.50	4
Part time	384	11	10
GPs	140	3	4
Practice nurses	77	2	1.75
Practice managers	33	1	0
Receptionists	183	5	4
Other staff group	94	2	4
Ethnic minority staff	109	2	3.0
White British staff	408	10	13.0

Linguistic skillset and cultural awareness of practice staff and their provision of diabetes services to minority groups

All 517 GP practice staff spoke English. One hundred and sixty-four of this total, on average 3.2 (IQR=5) members of staff per practice, spoke a second language relevant to the practice's minority population. Of the 164, 134 (82%) spoke at least one of the most frequently spoken South Asian languages in the research setting. The distribution of the languages spoken across the 34 practices is presented in Fig. 1. One practice had staff who spoke all the five South Asian languages. Only six (19%) diabetes lead nurses spoke a relevant minority language. Eight practices in which greater than 40% of their diabetic population were ethnic minorities had no diabetes lead nurse who spoke a minority language. There were a variety of approaches across the eight practices; one with 57 (44%) minority patients with diabetes, stated the language barrier as a major issue, but did not use interpreters/translators or multilingual link workers or have minority staff. Another practice which had 41% (n=312) of its diabetic population being from ethnic minorities used interpreters/translators and link workers. A third practice which had 274 (55%) of the practice diabetic population from minority groups used six minority staff [GPs (n=2), practice nurses (n=2), receptionists (n=2)] who spoke five relevant minority languages, and used informal interpreters when necessary. The remaining five practices used either informal interpreters/translators or multilingual link workers, and/or referred their minority patients to other providers for cultural-specific diabetes services not offered at the patient's registered practice. Practice staff perceived enhanced cultural awareness would improve their relationship with people from ethnic minority groups when delivering diabetes care in 16 GP practices (47%); 35% (n=12) were unsure, and 18% (n=6) stated that improvements in cultural awareness would not make any difference.

In order to improve culturally-competent diabetes services to minority groups, 21 practices stated the need for additional funding, for cultural competence training (n=23), and for additional staff (n=21).

Furthermore, 21 practices (62%) identified other local services (Fig. 2) likely to support them to deliver better services to minority patients within their practices, with the majority stating the need for structured culturally-competent education programmes (n=5) and multilingual information in various formats (n=6). In addition, 18 practices (53%) offered specific self-management training for minority patients with diabetes and sixteen (47%) were aware of locally available resources for these patients.

Fig. 1: Distribution of linguistic capabilities of GP staff

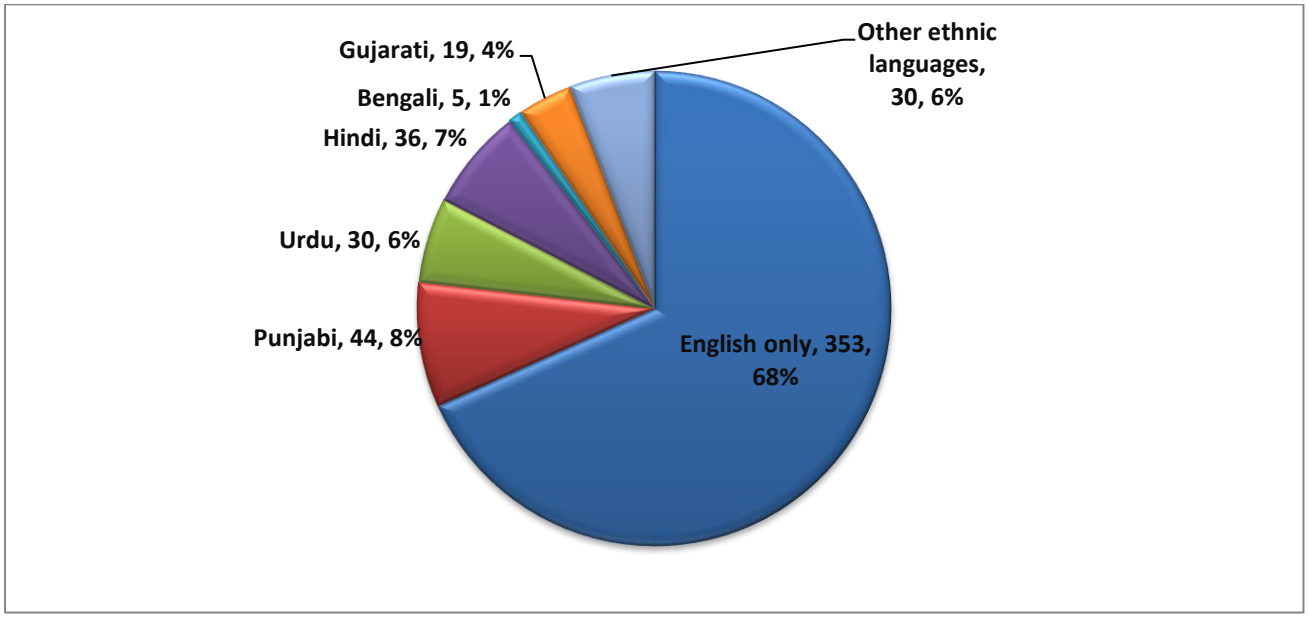
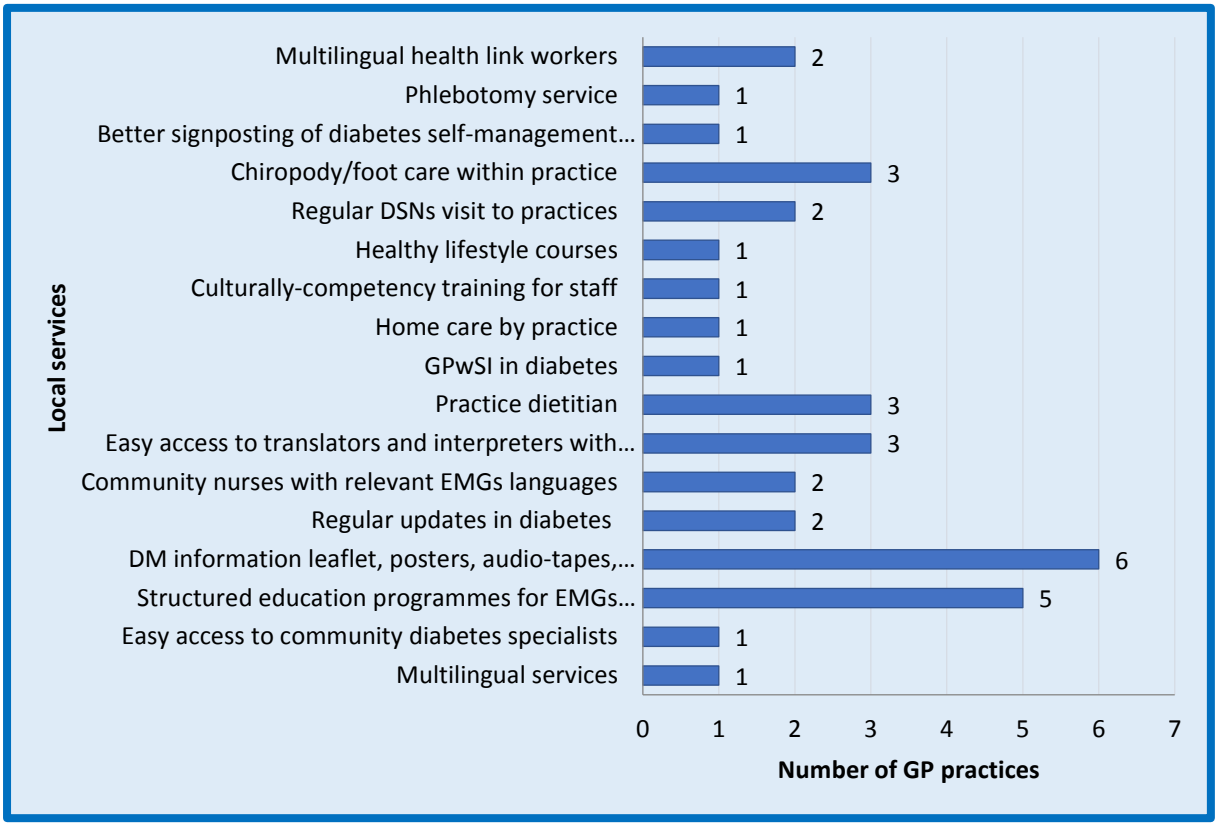


Fig. 2: Local services likely to support staff to deliver better services to minority groups with diabetes



Staff training and diabetes knowledge

All 34 (100%) practices stated their medical and nursing staff received regular formal training on diabetes management through in-house training, attending clinical meetings and formal courses locally/nationally during study days and protected learning time (PLT), e-learning, and general reading. The training/knowledge was provided by a wide range of diabetes specialists and institutions locally and nationally once the needs were identified by individual staff and/or their employers.

Of the 31 (91.18%) practices that had a lead nurse for diabetes, 25 (80.65%) had received diabetes education. Fifteen lead nurses had qualifications at certificate level, nine diploma level and one at master's level. All six single-handed practices had a diabetes lead nurse of which four (66.66%) had a formal diabetes.

No practice reported receiving formal/structured specific cultural competence training. Twenty-one (61%) practices reported staff having knowledge of patients' cultural beliefs surrounding diabetes care services, 5 (15%) reported inadequate understanding thereof and 8 (24%) were unsure.

Cultural competences of GP practices

Using the the CCAT 10-item (Table 1) to assess each GP practice, overall, 19 (56%) practices were found to be highly culturally-competent at providing diabetes services for people from minority groups (scoring 90%-100%), nine (26%) moderately culturally-competent (70%-89%), and the remaining 18% (n=6) poor/weak (<70%). The proportional representation of cultural competence in each overall category based on the self-reported data is showed in Fig. 3.

Based on the City's Index of Multiple Deprivation (IMD) (2015), 13 (38%) of the 34 GP practices were in deprived areas, 10 (30%) in affluent areas and 11 (32%) in less deprived areas. Of the 19 (56%)

practices which provided highly culturally-competent services, 10 (53%) were in deprived areas (of which four reported high minority populations with diabetes and also employed more ethnic minority staff), 3 (16%) in affluent areas and 6 (31%) in less deprived areas. Fig. 4 shows the distribution of the 34 practices based on IMD vs categories of cultural competences.

All GP practices met three of the ten CCAT questions (100%) (Table 3) by having: staff with specialist knowledge in diabetes (a), who met the health literacy needs of their patients (b) and ensured that their service worked (c). Of the 23 GP practices that were found to be both proactive to the specific linguistic needs of their patients and demonstrated cultural awareness, 83% (n=19) provided highly culturally-competent diabetes services whilst 17% (n=4) provided moderately culturally-competent diabetes services.

Fig. 3: Proportional representation of cultural competence in each overall category

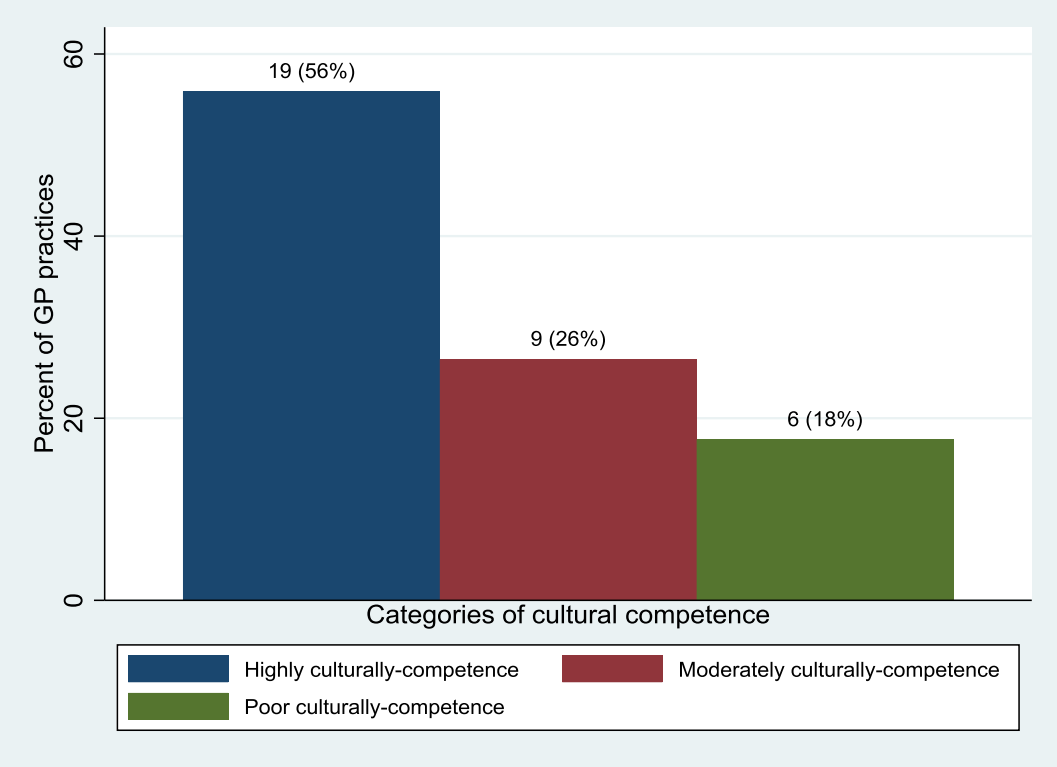


Fig. 4: Distribution of GP practices based on Index of Multiple Deprivation vs Categories of cultural competences

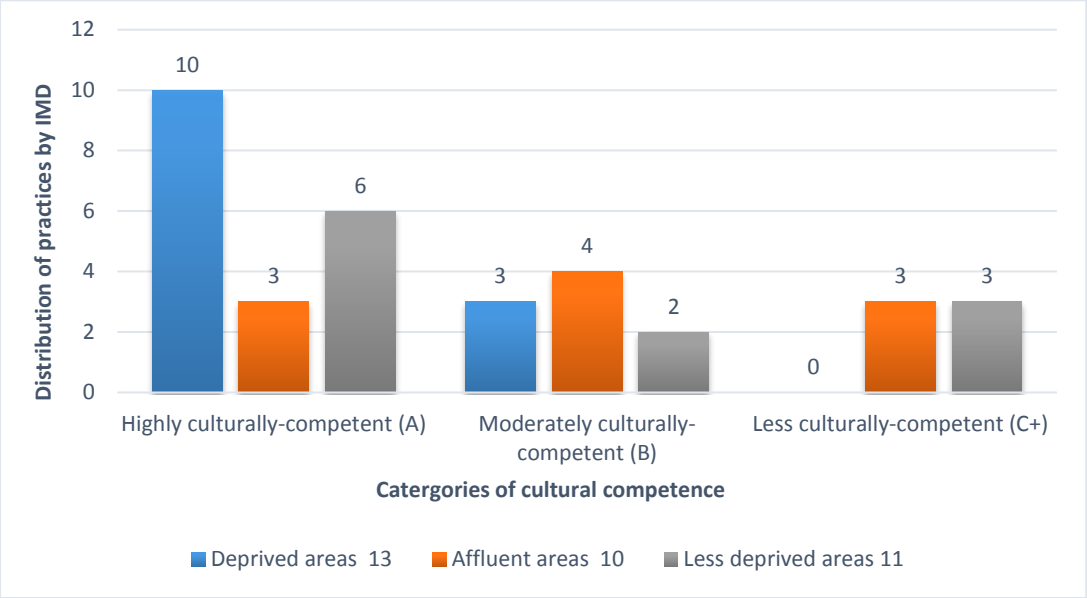


Table 3: Assessment of the level of cultural competences within GP practices from self-reported data using the tool proposed by Zeh et al. (2012)

	CCAT Q1 Clear focus on EMG? N (%)	**CCAT Q2** Sensitive to the specific linguistic needs? N (%)	**CCAT Q3** Demonstrate cultural awareness? N (%)	**CCAT Q4** Have cultural knowledge? N (%)	**CCAT Q5** Specialist knowledge in diabetes? N (%)	**CCAT Q6** Linguistic needs of patients met? N (%)	**CCAT Q7** Health literacy needs met? N (%)	**CCAT Q8** Culturally-competent in care delivery N (%)	**CCAT Q9** Culturally sensitive? **N (%)**	**CCAT Q10** Does the intervention / service work? N (%)
Yes	31 (88)	31 (91)	25 (74)	25 (73)	34 (100)	30 (88)	34 (100)	29 (85)	0 (0)	34 (100)
No	0 (0)	2 (6)	1 (3)	2 (6)	0 (0)	1 (3)	0 (0)	1 (3)	0 (0)	0 (0)
Unclear	4 (12)	1 (3)	8 (23)	7 (21)	0 (0)	3 (9)	0 (0)	4 (12)	34 (100)	0 (0)

DISCUSSION

Statement of the principal findings

We have identified some of the key challenges facing GP practices providing diabetes health services to minority populations. The cultural competence of such services depends mostly on general practices' familiarity with staff ethnicity, the linguistic skill set and cultural awareness of practice staff. Importantly staff acquisition of diabetes knowledge, access to diabetes training and the level of cultural competence in diabetes services were also identified. These barriers are similar to those found worldwide in diabetes services delivery involving minority populations 16, 18, 19, 36, 37).

Our diabetes delivery survey to all GP practices in the city, could be used by primary care providers in other multicultural industrial cities to aid local healthcare planning. The level of cultural competences of diabetes services within each responded practice was systematically assessed and the proportional representation of each overall category of cultural competence reported. Fifty-six percent of GP practices were found to be providing highly culturally-competent diabetes services for people from minority background, perhaps due in part to the fact that general practice staff from minority groups were well represented among staff in the GP practices in Coventry (1:5 compared to 1:10 in the Coventry population). However, the delivery of culturally-competent diabetes services remains challenging as minority staff may not be specialists in diabetes, may not be available for all consultations or conversant in all of the required languages, especially in this city where the minority population is highly heterogeneous. For example, individual nurse-patient diabetes services were the most commonly provided diabetes service across the practices, yet, only a few of the diabetes lead nurses spoke a minority second language despite this being fundamental to establishing meaningful communication with minority people with diabetes (21, 38, 39). Reliance is

therefore largely on interpreters, thus raising doubts about the effectiveness of communication and the quality of information received by patients as the use of interpreters is known to lead to suboptimal communication in clinical consultations (40). In contrast, a diabetes intervention, which used primary lay culturally-concordant providers trained in diabetes management and sharing ethnicity with the participants (31), resulted in improved diabetes knowledge, self-management behaviour, and glycemic control (42).

Despite all practices reporting staff receiving specialist training in diabetes care, there was no evidence that this included structured cultural competence training. One systematic review (19) found that using culturally-and linguistically competent service providers in four diabetes health interventions (29-32) produced greater improved patient diabetes-related outcome measures when compared with baseline measures, including between group changes in HbA1C when the interventionists were also trained in diabetes management (31, 32). Practices in our survey reported a need for cultural-competence training, to improve staff's cultural awareness, cultural knowledge, and professional skills, which would in turn lead to positive changes in staff behaviour and more meaningful patient-staff interactions in cross-cultural situations (43, 44). Furthermore, this survey provides data to determine where participating practices and local services commissioners should focus future education of cultural competence issues at individual and practice levels.

Despite 56% of diabetes service provision in the research setting being found to be highly culturally-competent, there are still significant barriers to full engagement with minority groups regarding their diabetes care. The impact on patient outcomes is unclear from our data and no known comparisons with similar cities have been reported. Further studies should consider using CCAT to assess the cultural competence of any interventions aimed at minority

healthcare populations (19). Providing culturally-competent care has been associated with improved provider-patient communications, concordance with medical regimens, greater satisfaction with care and better health-related outcome measures (45, 46).

There are several limitations to this study. The questionnaires were completed by a single staff member and some responses could have been based on professional perception of diabetes services rather than the reality in the practice data. The analysis of this survey might constitute an information bias as it was based on self-reported data and not from independent assessment or observation, such as interviews that may have required additional probing to better understand the phenomenon under investigation. Furthermore, individuals' understandings of what would constitute a 'culturally-competent service' are unclear. The CCAT (19), which includes ten culturally-competent criteria to systematically determine cultural competence (accompanied by 6 page guidance notes), may be perceived as having a rather basic approach to a complex problem. Further empirical refinement of concepts within the CCAT may be required to strengthen its validity and reliability to reflect this rapidly developing field (33, 42, 47, 48). Furthermore, instead of 'equally weighting' each criterion within the CCAT, it could be further developed as a self-assessment tool where the weighting of each criterion can be explored (3).

CONCLUSIONS AND RECOMENDATIONS

The findings from this research suggest some degree of culturally-competent health services provision in diabetes across the city, which could further be improved by implementing accessible structured cultural competence training to support primary care workers. The authors also successfully used CCAT (19) to systematically assess the level of cultural competences of each GP practice from self-reported data. To generate further research in this

area and improve the provision of culturally-competent primary care diabetes services to people from ethnic minority groups, the researchers recommend:

- Effective communication to safeguard healthcare quality, particularly in minority groups with cultural and linguistic needs. Where little or no linguistically and/or culturally-competent staff are available, a Diabetes Specialist Multilingual Link Worker Service (made up of lay experienced diabetes and linguistically-and-culturally concordant providers), is recommended.
- Structured cultural competence training for primary care workers to support them to deliver meaningful diabetes services to minority populations, which could potentially maximise diabetes-related outcomes in these populations.
- Well-designed methodological studies to investigate if structured cultural competence training for diabetes service providers generally produces a positive effect in diabetes-related outcome measures in minority populations.
- Both the CCAT and this survey be further modified for use in other areas of healthcare interventions aimed at any primary care chronic diseases services involving minority populations.
- Health care organisations to make structured cultural competence training mandatory in order to improve the provision of culturally-competent services as the exacerbating refugee and economic migration of national populations around the world are likely to continue. This may include in some occasions employing appropriately skilled and trained refuges/immigrants in various healthcare specialties to support the health of the same migrant populations.

Conflict of Interest: All authors have declared no competing interests with respect to this research and/or publication or authorship that could inappropriately influence their work.

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Contributors: PZ conceived the study design, directed the study implementation, analysed data as a component of his doctoral training and directed the manuscript preparation. HKS, AMC and JAS supervised the doctoral training and in this role participated in the design and implementation of the study as well as in the manuscript preparation. JW directed the statistical analysis and also participated in the review of the manuscript.

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REFERENCES

1. IDF. International Diabetes Federation (IDF) Diabetes Atlas. (4th edition). Brussels: International Diabetes Federation, 2009.
2. World Health Organisation (2016) Global Report on Diabetes. World Health Organisation. http://apps.who.int/iris/bitstream/10665/204871/1/9789241565257_eng.pdf. Last accessed in October 2017.
3. Zeh, P. Delivering Diabetes Care to Ethnic Diversity (DEDICATED): exploring potential barriers and solutions to delivering high quality diabetes care to people from ethnic minority groups. PhD thesis, 2013; University of Warwick. http://wrap.warwick.ac.uk/62062/. Last accessed in December 2017.
4. Barroso, I. (2005). Genetics of Type 2 diabetes. Diabetic Medicine; 22 (5): 517-35.
5. DUK (2016) Causes of type 2 diabetes. http://www.nhs.uk/Conditions/Diabetes-type2/Pages/Causes.aspx and what is Type 2 diabetes? http://www.diabetes.org.uk/Guide-to-diabetes/What-is-diabetes/Diabetes-risk-factors/. Last accessed December 2017.
6. Oldroyd, J., Banerjee, M., Heald, A. and Cruickshank, K. Diabetes and ethnic minorities. Postgraduate Medical Journal. 2005; 81 (958): 486-490.
7. WHO (World Health Organisation) Non-communicable diseases country profiles 2011: WHO global report. New York: WHO, 2011.
8. Mather, H. M., Chaturvedi, N. and Fuller, J. H. (1998) Mortality and morbidity from diabetes in South Asians and Europeans: 11-year follow-up of the Southall Diabetes Survey, London, UK. Diabetic Medicine. 15, 53–59.

9. Khunti, K., Kumar, S. and Jo Brodie, J. (2009) Eds. 1st edition. Diabetes UK and South Asian Health Foundation recommendations on diabetes research priorities for British South Asians. London: Diabetes UK.
10. Gholap, N., Davies, M., Patel, K., Sattar, N., Khunti, K. (2010) Type 2 diabetes and cardiovascular disease in South Asians. Primary Care Diabetes; 5 (1): 45-56.
11. Winkley, K; Thomas, S; Sivaprasad, S.; Chamley, M; Stahl, D; Ismail, K; Amiel, S. The clinical characteristics at diagnosis of type 2 diabetes in a multi-ethnic population: the South London Diabetes cohort (SOUL-D). Diabetologia, 2013; 55 (6): 1272– 81.
12. Sidhu MS, Griffith L, Jolly K, Gill P, Marshall T& Gale NK (2016): Long-term conditions, self-management and systems of support: an exploration of health beliefs and practices within the Sikh community, Birmingham, UK. Ethnicity & Health. http://dx.doi.org/10.1080/13557858.2015.1126560. Last accessed in October 2017.
13. Zeh P. Delivering diabetes care to ethnic groups: a pilot general practice survey. Diabetes and Primary Care Journal. 2010; 12 (5): 280 - 90.
14. Liu, JJ, Davidson, E., Bhopal R., White, M., Johnson, M., Netto, G. and Sheikh, A. Adapting health promotion interventions for ethnic minority groups: a qualitative study. Health Promotion International. 2015; doi:10.1093/heapro/dau105. Downloaded from http://heapro.oxfordjournals.org/ page 1-11. Accessed in April 2017.
15. Brown, K., Dyas, J., Chahal, P., Khalil, Y., Riaz, P. and Cummings-Jones, J. Discovering the research priorities of people with diabetes in a multicultural community: a focus group study. British Journal of General Practice. 2006; 56 (524): 206-213.

16. Hawthorne K, Mello M, Tomlinson S. Cultural and Religious influences in diabetes care in Great Britain. Diabetic Medicine. 1993; 10(1): 8-12.
17. Cone DC, Richardson LD, Todd KH, Betancourt JR, Lowe RA. Health Care Disparities in Emergency Medicine. Academic Emergency Medicine. 2003; 10(11): 1176-83.
18. Zeh P, Sandhu H, Cannaby AM & Sturt J. Cultural barriers impeding ethnic minority groups from accessing effective diabetes care services: a systematic review of observational studies. Diversity and Equality in Health and Care; 2014; 11: 9-33.
19. Zeh P, Sandhu HK, Cannaby AM, Sturt JA. The impact of culturally competent diabetes care interventions for improving diabetes-related outcomes in ethnic minority groups: a systematic review. Diabetic Medicine. 2012; 29 (10): 1237-52.
20. Greenhalgh, T., Collard, A. and Begum, N. Sharing stories: complex intervention for diabetes education in minority ethnic groups who do not speak English. BMJ, 2005; 330: 628-631.
21. Wolf AM, Siadaty M, Yaeger B, Conaway MR, Crowther JQ, Nadler JL, et al. Effects of lifestyle intervention on health care costs: improving control with activity and nutrition (ICAN). Journal of the American Dietetic Association. 2007; 107(8):1365-73.
22. Papadopoulos, I., Tilki, M. and Lees, S. Promoting cultural competence in healthcare through a research-based intervention in the UK. Diversity in Health and Social Care, 2004; 1 (2): 107-115.
23. Price EG, Beach MC, Tiffany LG, Robinson KA, Gozu A, Palacio A, Smarth C, Jenckes M, Feuerstein C, Bass EB, Powe, NR, and Cooper LA. A Systematic Review of the Methodological Rigor of Studies Evaluating Cultural Competence Training of Health Professionals. Academic Medicine. 2005; 578 – 586.

24. Quality and Outcomes Framework [QOF]. Diabetes Data - Quality and Outcomes Framework Management and Analysis System (QMAS) 1st April 2011. Coventry: NHS Coventry, 2011.
25. Quality and Outcomes Framework [QOF]. Diabetes Data - Quality and Outcomes Framework Management and Analysis System (QMAS) 1st April 2014. Coventry: NHS Coventry and Rugby CCG, 2015.
26. Bellary S, Barnett A. Novel approach to managing diabetes and CVD in South Asians. Diabetes and Primary Care. 2007; 9(6): 307-14.
27. DUK. Diabetes and the disadvantaged: reducing health inequalities in the UK. London: Diabetes UK, 2006.
28. Barker C. Coventry Public Health Report. Coventry: Coventry Health Authority, 2006.
29. O'Hare J, Raymond N, Mughal S, Dodd L, Hanif W, Ahmad Y, et al. Evaluation of delivery of enhanced diabetes care to patients of South Asian ethnicity: the United Kingdom Asian Diabetes Study (UKADS). Diabetic medicine. 2004; 21(12):1357-65.
30. Bellary S, O'Hare JP, Raymond N, Gumber A, Mughal S, Szczepura A, et al. Enhanced diabetes care to patients of south Asian ethnic origin (the United Kingdom Asian Diabetes Study): a cluster randomised controlled trial. The Lancet. 2008; 371(9626):1769-76.
31. Joshi R, Joshi N, Helmuth A. Improving ambulatory diabetes care in high-risk racial minorities: use of culture-specific education and close follow-up. Endocrine Practice. 2010; 16(2):171-7.
32. Mehler PS, Lundgren RA, Pines I, Doll K. A community study of language concordance in Russian patients with diabetes. Ethnicity & Disease. 2004; 14(4):584-8.

33. Zeh, P, Sandhu, HK, Warwick, J, Cannaby, AM, Sturt, JA. Exploring culturally competent primary care diabetes services: A single city survey. Diabetic Medicine. 2015, http://onlinelibrary.wiley.com/doi/10.1111/dme.13000/full.
34. Bowling A. Research methods in health: investigating health and health services. 3rd edn. Maidenhead: McGraw Hill/Open University Press; 2009.
35. LoBiondo-Wood G, Haber J. Nursing research: methods and critical appraisal for evidence based practice. 7th edn. Missouri: Mosby; 2009.
36. Brown SA, Garcia AA, Winchell M. Reaching underserved populations and cultural competence in diabetes education. Current Diabetes Reports. 2002; 2(2): 166-76.
37. Fleming E, Gillibrand W. An exploration of culture, diabetes, and nursing in the South Asian community: a metasynthesis of qualitative studies. Journal of Transcultural Nursing. 2009; 20 (2): 146-55.
38. Greenhalgh, T. Communicating with people who have limited English. Diabetes and Primary Care. 2008; 10 (2): 89-93.
39. Seale, C., Rivas, C., Kelly, M. The challenge of communication in interpreted consultations in diabetes care: a mixed methods study. British Journal of General Practice. 2013; e126-133. DOI: 10.3399/bjgp13X663082. http://bjgp.org/content/bjgp/63/607/e125.full.pdf. last accessed in January 2018.
40. Grace C, Begum R, Subhani S, Peter Kopelman, P., Greenhalgh, T. Prevention of type 2 diabetes in British Bangladeshis: qualitative study of community, religious, and professional perspectives. BMJ. 2008; 337:a1931.
41. Szczepura, A., Johnson, M., Gumber, A., Jones, K., Clay, D. and Shaw, A. An Overview of the Research Evidence on Ethnicity and Communication in Healthcare - Commissioned by the Department of Health. ISBN 0 9535430 4 8. Coventry: University of Warwick, 2005.

42. Ricci-Cabello, I., Ruiz-Pérez, I., Rojas-García, A., Pastor, G., Rodríguez-Barranco, M. and Gonçalves, D. Characteristics and effectiveness of diabetes self-management educational programs targeted to racial/ethnic minority groups: a systematic review, meta-analysis and meta-regression. BMC Endocrine Disorders, 2014; 14 (60): 1-13. http://www.biomedcentral.com/1472-6823/14/60. Last accessed in August 2017.
43. Majumdar, B., Browne, G., Roberts, J. and Carpio, B. Effects of cultural sensitivity training on health care provider attitudes and patient outcomes. Journal of Nursing Scholarship. 2004; 36 (2): 161-166.
44. Khanna, S. K., Cheyney, M. and Engle, M. Cultural competency in health care: evaluating the outcomes of a cultural competency training among health care professionals. Journal of the National Medical Association. 2009; 101 (9): 886-892.
45. Schim, SM, Doorenbos, AZ, Borse, NN Cultural Competence Among Ontario and Michigan Healthcare Providers. Journal of Nursing Scholarship. 2005; 37 (4): 354-360.
46. Fortier, JP and Bishop, D. Setting the agenda for research on cultural competence in health care: Final report. Rockville, MD: Agency for Healthcare Research and Quality, 2003..
47. Truong1, M, Paradies, Y and Priest, N. Interventions to improve cultural competency in healthcare: a systematic review of reviews. BMC Health Services Research 2014, 14:99. http://www.biomedcentral.com/1472-6963/14/99.
48. Attridge M, Creamer J, Ramsden M, Cannings-John R, Hawthorne K. Culturally appropriate health education for people in ethnic minority groups with type 2 diabetes mellitus. Cochrane Database of Systematic Reviews 2014, Issue 9. Art. No.: CD006424. DOI: 10.1002/14651858.CD006424.pub3.