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Inadequate diabetes control is more prevalent in South Asians than Europeans: potential role of therapeutic inertia

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Refer to Oral number A14

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Disparities in the prescribing of DPP-4 inhibitors, SGLT2 inhibitors, and GLP-1 analogues in UK primary care

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Aims: People with lower socioeconomic status (SES) and ethnic minority groups have worse glycaemic control and higher incidence of diabetes complications. We evaluated the use of newer diabetes therapies (DPP-4 inhibitors, SGLT2 inhibitors, and GLP-1 analogues) across SES and ethnic groups to identify any disparities in use which may be contributing to ongoing outcome disparities.

Methods: A cohort of people with Type 2 diabetes (N = 60,327) was identified from the University of Surrey-Lilly Real World Evidence database, using routinely collected primary care data. The number of people initiated on new therapies over a 12 month period (2015) was analysed. The impact of SES and ethnicity on propensity to prescribe was investigated using logistic regression adjusting for potential confounders (age, gender, glycaemic control, duration of diabetes, number of previous therapies, renal function, and body mass index).

Results: We identified 2,599 people initiated on DPP-4 inhibitors, 1,118 on SGLT2 inhibitors, and 556 on GLP-1 analogues. After adjusting for confounders there were no differences in prescribing by SES. Compared to those of White ethnicity, there was reduced propensity to prescribe SGLT2 inhibitors to those of Black (OR 0.48; 95% CI 0.32-0.71; $p < 0.001$) or Asian ethnicity (OR 0.61; 0.48-0.78; $p < 0.001$), and there was reduced propensity to prescribe GLP-1 analogues to those of Asian ethnicity (OR 0.53; 0.35-0.81; $p = 0.003$). No significant difference in prescribing propensity was found with DPP-4 inhibitors.

Conclusions: There was no association between prescribing newer medications and SES. However, we found a strong interaction between ethnic group and propensity to prescribe newer therapies.

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The management of hypertension in Afro-Caribbean patients with Type 2 diabetes at a large teaching primary care centre in BirminghamS Abdulrahman¹, A Chauhan¹ and MA Saeed^{2,3}*¹College of Medical and Dental Sciences, University of Birmingham, Birmingham, UK, ²Department of Diabetes, University Hospitals Birmingham, Birmingham, UK, ³School of Clinical and Experimental Medicine, University of Birmingham, Birmingham, UK*

Aims: Hypertension affects a third of the population in England, with Afro-Caribbean people constituting a high-risk group. Due to their differing pathophysiology, NICE guidance published in 2009 [CG87] and revised in 2015 [NG28] recommends that when living with Type 2 diabetes they should be prescribed an angiotensin converter enzyme inhibitor (ACEi) together with either a calcium channel blocker (CCB) or diuretic as first-line therapy for hypertension and reno-protection. We investigated whether the NICE guidance on hypertension management is being adhered to in people of Afro-Caribbean ethnicity living with Type 2 diabetes (diagnosed since the introduction of the 2009 guideline) in a large teaching primary care centre located in an ethnically diverse area of Birmingham.

Methods: Using the EMIS electronic records, people matching the above criteria were identified and the relevant data was collected.

Results: For the 60 patients identified, surprisingly only a third (n = 20) were managed in-line with the guidance. Of the two-thirds who were not, 90% (n = 36) had not been prescribed the recommended combination. The remaining 10% (n = 4) had not tolerated first-line therapy (hyperkalaemia, hypotension, and/or, other adverse reactions). 26.7% (n = 16) of the sample had a sub-optimal blood pressure, with 75% (n = 12) not having been monitored within the recommended timeframe laid out by NICE.

Conclusion: Adherence to NICE guidance in relation to ethnic-specific hypertension prescribing for patients with Type 2 diabetes appears to be suboptimal in primary care. Knowledge of this aspect of the guideline needs to be reinforced by diabetes organisations and charities, e.g. Diabetes UK.

Clinical care and other categories posters: foot

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Diabetes foot care: survey of practice in primary careS Kassim¹, I McDermott¹, B Power¹, F Day¹, M Greensmith² and P Carder³*¹Long Term Condition Clinical Network, NHS Leeds Clinical Commissioning Group, Leeds, UK, ²Diabetes Clinical Network, NHS England, Willerby, UK, ³West Yorkshire Research and Development, NHS Bradford Districts Clinical Commissioning Group, Bradford, UK*

Aims: There is an inconsistency of competencies in delivery of diabetic foot care in primary care. The aim of the study was to determine the knowledge and practice of foot checks amongst health professionals in primary care.

Methods: An anonymous questionnaire was completed by variety of health professionals involving general practitioners, practice nurses, advance nurse practitioners and health care assistants working in primary care team in Leeds West CCG area. The survey was conducted over three weeks.

Results: In total, out of the 65 health professionals participated in the survey, 40% were GP practitioners, 28% practice nurses, 28% health care assistants and the remaining 4% advance nurse practitioners. The overall response rate of 16.5% was obtained based on estimated number of workforce in primary care team in Leeds West CCG. Nearly 30% involved in the diabetes foot care check never had any formal training on conducting diabetes foot check. 31% of correspondents never feel for foot pulses in a diabetes foot check. 71% of correspondents were not able to accurately identify local

Leeds indications criteria for immediate referral to hospital multi-disciplinary foot team. Amongst the various health professionals, 78% of health care assistants have never referred to the local screening and pathway guidance for diabetic foot ulcers.

Conclusions: There are significant gaps in knowledge and quality of diabetes foot checks in primary care team. There is an urgent need for implementing a minimum core standard competencies and training for non-specialists especially health care assistants involved in diabetes care delivery including foot care.

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Daily treatment with the anabolic agent recombinant human parathyroid hormone does not enhance time to resolution, fracture healing and resolution of bone marrow oedema of the active Charcot foot: results from a double blind randomised placebo controlled investigator led clinical trial

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The impact of pre-existing vascular complications on mortality in patients with diabetic foot ulcers

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Introduction: It is recognised that the high levels of premature mortality in patients with diabetic foot ulcers is predominantly related to cardiovascular mortality. Many of these individuals have evidence of pre-existing vascular complications. This study aimed to investigate the impact that these complications on patient mortality.

Methods: Patients (n = 300) were recruited at their first diabetic foot clinic appointment with a new ulcer. Structured interviews were performed to identify patients with a history of macrovascular complications; classified as a history of MI, stroke, intermittent claudication or absent foot pulses on clinical examination. Twelve (n = 200) and 24 (n = 132) month outcomes were prospectively assessed to compare mortality rates in patients with and without macrovascular complications.

Results: At baseline 161 patients (53.7%) were classified as having macrovascular disease. Of these, 101 (62.7%) had an absent foot pulse, 52 (32.3%) had a history of MI, 40 (24.8%) a history of stroke and 42 (26.1%) a history of intermittent claudication. At 12 months there was a 3-fold increase in mortality in patients with macrovascular complications compared with those without (16.5% vs 5.6%, p = 0.016). At 24 months this increased to a 6-fold increase (24.4% compared with 3.8%, p = 0.002).

Conclusions: In patients with diabetic foot ulcers, a history of macrovascular complications was associated with substantially

higher rates of mortality. Active systematic identification of these patients, which is not currently routine practice in most foot clinics, would allow for more effective risk stratification and ensure those at the highest risk of dying prematurely receive more comprehensive clinical attention.

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Impact of the foot protection service on outcomes in people with diabetic foot ulcers

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Background and Aims: A cornerstone of the NICE guidelines on diabetes foot care is the provision of a podiatry-led foot protection service (FPS). Yet there is currently no published evidence on its ability to reduce the incidence of diabetic foot ulcers and associated complications. This study aimed to investigate the impact and efficacy of the FPS on reducing these critical outcomes.

Methods: Patients (n = 300) were recruited during their first diabetic foot clinic appointment with a new foot ulcer (stratified into those with first ulcers and recurrent ulcers). Twelve (n = 200) and 24 (n = 132) month outcomes were prospectively assessed to compare healing times and complication rates (re-ulceration, amputation, ulcer not healed at 1 year) between those attending and not attending the FPS.

Results: Significantly fewer patients presenting with their first ulcer were attending the FPS than those with recurrent ulcers (63.9% vs 83.7%, p < 0.001). In patients presenting with first ulcers, FPS attendance was associated with significantly shorter healing times (12 months: median 9.0 vs 14.0 weeks, p = 0.049, 24 months: 7.0 vs 19.0 weeks, p = 0.003). FPS attendance was also associated with fewer complications (complication free at 12 months: 78.6% vs 63.6%, p = 0.174, 24 months: 73.3% vs 40%, p = 0.03). No difference was seen in either outcome in those with recurrent ulceration.

Conclusions: Over a third of patients presenting with a first ulcer had not previously seen the FPS. In first ulcer patients, attendance of the FPS is associated with faster healing and lower complication rates. The FPS is less efficacious in those with recurrent ulceration.

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Implementation of a new diabetic foot assessment tool: a pilot project

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Introduction: Around 5 million people will have diabetes by the year 2025 in UK. At least 10% of the patient will have diabetic foot disease in their life. It has significant mortality, morbidity and cost implication. Within 5 years of developing a diabetic foot ulcer mortality rate is about 50%. Recent data from NADIA showed that foot protection is not up to the required standard across UK. In light of that we have developed a foot protection tool to improve the assessment of patients who are at risk of foot disease.

Methodology: The tool was based on the 'Foot of bed form' devised by Dr Gerry Rayman, Ipswich Hospital. It was implemented as a pilot project in the diabetic ward of University hospital of Llandough for 16 weeks and acute admission unit for 2 weeks. Patients with a known diagnosis of diabetes were only included in

the data collection. Ward based presentation, practical demonstration, 1-to-1 support, e-learning tool, pocket card guide were provided prior to the intervention. Audit process was based on the NADIA audit.

Result: A baseline inpatient data prior to intervention showed 20% patient (total number 2) had a completed foot assessment. At the end of 16 weeks following implementation of tool, 80% (total number 10) of patients have their foot assessment completed. In acute admission 66 patients were identified and 33% (19) have their assessment completed during their admission.

Conclusion: Our project demonstrate that implementation of the assessment tool along with training and education can improve the foot assessment among diabetic inpatient .

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Video training in diabetic foot examination: from initial conception to wider dissemination

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Introduction: The need for screening large number of individuals for diabetes foot problems poses challenges of manpower and training. Screening needs to be performed by a variety of healthcare professionals. Face-to-face training is key but further educational adjuncts may be helpful.

Aim: to establish the need for a resource on diabetic foot examination, produce a training video, ensure access, assess its impact, further develop the resource and guarantee wider dissemination.

Methods: Consultation about training needs, production of a video on diabetic foot examination meeting the national standards (Diabetes UK 2011 and TRIEPodD-UK 2012). Staff questionnaires to evaluate the initiative and national diabetes inpatients audit (NaDIA) to assess its impact on clinical practice. Technical upgrade, availability of the resource and dissemination using IT platforms.

Results: Feedback from the diabetes team highlighted the need for additional targeted training available long-term. An initial version of the video was disseminated through meetings followed by discussion. Evaluation questionnaires were completed before and after its introduction, showing a significant improvement in skills and confidence. NaDIA showed a huge improvement in inpatients screening between 2015 and 2016. We obtained funding from the London School of Medicine for an upgrade. The second version of the video is available on the Homerton Hospital intranet and youtube channel as well as the Synapse website, the NHS Health Education England communications network supporting postgraduate training in London.

Conclusions: This is the first training video widely available in the UK and meeting defined standards. It is a versatile, real-time, cost-effective and long-term adjunct to face-to-face training.

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Glycaemic variability as measured by the magnitude of change of visit to visit HbA1c concentrations over the five years prior to presentation, is significantly associated with rate of wound healing in the diabetic foot

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Background: Recent work has suggested that glycaemic variability – the visit-to-visit variation in HbA1c – plays a role in the development of micro and macrovascular disease in patients with diabetes. However, whether HbA1c variability is a factor determining wound healing in diabetes related foot ulcers remains unknown.

Aim: To investigate whether HbA1c variability is associated with healing time in patients presenting to our multidisciplinary specialist foot clinic.

Method: A retrospective analysis of patients attending between July 2013 and March 2015, with at least three HbA1c measurements five years prior first appointment and with more than two follow-up reviews up to one year of first appointment. HbA1c variation was measured by magnitude of Standard Deviation.

Results: 629 foot ulcers were referred to the clinic between July 2013 and March 2015. 328 cases were excluded. Of the remaining 301, 181 patients had their number of days to healing recorded.

The overall geometric mean days to heal was 91.1 days (SD 80.8 to 102.7). In the low HbA1c variability group the geometric mean days to heal was 72.1 days (58.3 to 89.1) and in the high HbA1c variability group the geometric mean days to heal was 106.5 days (89.4 to 126.9), ($p < 0.05$).

Discussion: Our novel data has shown that wound healing of a foot ulcer is significantly associated with HbA1c variability, with lower variability associated with shorter time to heal. These data confirm the importance of maintaining steady glycaemic control, but also emphasise that large variations in HbA1c over time lead to longer healing times.

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Neuropathy is more common than peripheral vascular disease or deformity as a risk factor for diabetic foot in urban Indian population

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Aim: Foot screening is uncommon in India due to lack of awareness. We developed a mobile screening van, which can be driven away for screening of chronic complications of diabetes. We wanted to analyse various risk factors of foot ulceration in this population.

Method: 12 mobile vans were used for screening at various primary care practices in India. They were equipped with retinal camera, point of care pathology test, ECG and detailed foot assessment tools. Screening was performed by trained nurses using standard protocols.

Results: 5,000 subjects were screened in urban and sub-urban India and available foot data on 969 were analysed. Mean age was 54.1 (± 11.5) years. 55 (5.7%) subjects needed active treatment on the spot for active ulcers or painful corn. 637 (72.6%) were not wearing appropriate footwear. Neuropathy in the form of absent monofilament sensation was present in 149 (15.4%) subjects. 34 had absent Dorsalis Pedis and 35 had absent Posterior Tibial pulses. 34 had a history of foot ulcers and 16 had previous amputations. Foot deformity was present in 38 subjects. Fissures were present in 452 (46.6%) and 434 (44.8%) had symptoms of painful neuropathy.

Discussion: High risk foot is present in 15% subjects due to neuropathy but peripheral vascular disease was rare. This may be due to younger age of this population. Foot deformity was less common in this population possibly due to use of open shoes and the use of protective footwear was lacking. There is a need to increase awareness of diabetic foot problem in India.

Acknowledgement: Screening Team

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The use of thermal imaging in the follow-up of healed diabetic foot ulcers

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Aims: The aim was to use a novel thermal imaging system to determine bilateral skin temperatures at sites of previously healed foot ulcers in diabetic patients. Previous studies in high-risk patients with infrared spot thermometry have shown that areas with foot temperature 2.2°C or greater than the corresponding contralateral site are at risk of an ulcer.

Methods: In this multi-centre trial (NCT02579070) we studied 47 patients (37 males; age 61 \pm 11.6 years [mean \pm SD]; 14 type 1 and 33 Type 2 diabetes; mean duration of diabetes 21 \pm 13.8 years) with a past history of ≥ 1 foot ulcer and intact feet for ≥ 3 months. Skin temperatures at the sites of healed foot ulcers and their corresponding contralateral sites were measured and the temperature difference (ΔT) was calculated.

Results: Eight patients had a history of bilateral symmetrical ulcers and ΔT was not applicable. Fifty-eight healed ulcer sites in 39 patients were analysed. Twenty-eight ulcer sites were warmer than the contralateral sites (ΔT range 0°C to 2.1°C). Twenty two ulcer sites were cooler than the contralateral sites (ΔT range -0.1°C to -2.1°C at 20 sites and ΔT below -2.2°C at 2 sites). However, at eight healed ulcer sites, ΔT was greater than 2.2°C (ΔT range 2.5°C to 8.6°C) and these sites were classified as hot spots on the thermal images. These hot spots were offloaded as per local standards and none had ulcerated at the next clinic visit (2-4 weeks).

Conclusions: This study shows the potential role of thermal imaging in the assessment and prevention of diabetic foot ulcers.

Acknowledgement: The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health.

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Age at amputation is strongly related to mortality during ten years follow up

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Objectives: NICE literature review suggests that in diabetes patients, up to 70% of people die within five years of having an amputation. We wanted to study ten years survival after first recorded lower limb amputation in our cohort.

Method: This was a retrospective study on 233 patients (159 males) who underwent amputation between 1997 and July 2006. List was obtained from discharge summary and theatre record. 63 subjects underwent further amputation but were grouped as their first amputation level into major (above ankle) or minor (below ankle). Electronic database was examined in August 2016 to know the date of their death.

Results: During follow up one year survival was 64%, three years 50%, five years 40%, seven years 34% and 10 years 28%. People who died by 10 years were older (70.2 \pm 11.5 vs 62.4 \pm 12.2 years: $P < 0.0001$) and had serum album level below normal at presentation ($p < 0.05$). There was no difference in 10 year mortality between gender, presence of anaemia, cholesterol level and HbA1c level ($p > 0.05$) at presentation. There was no difference in 10 year mortality with amputation level.

Discussion: Mortality was highest within 12 months, which could be due to existing co-morbidities. It was stable after five years. Old age was related to death in our study but level of amputation was not, which could be due to 63 subjects who underwent further amputation but were grouped as their first recorded amputation.

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Five year mortality following diabetic amputation has not changed over 14 years

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Objectives: There is higher five year mortality following diabetes related amputations. We wanted to study if this has changed over the last 14 years in our cohort.

Method: This was a retrospective study on 356 patients who underwent amputation between 1997 and 2010. List was obtained from discharge summary and theatre record. Subjects who underwent amputation between 1997 and 2003 were 'Early' cohort and those between 2004 and 2010 were 'Late' cohort. Amputations were grouped at their first surgery into major (above ankle) or minor (below ankle). Electronic database was examined in 2016 to know the date of their death.

Results: There was no difference in the mean number of total amputations performed annually between early and late cohort (25 \pm 8.8 vs 25.9 \pm 4.9; $p > 0.05$), however there was a significant reduction in major amputations performed annually (18.4 \pm 3.9 vs 12.9 \pm 3.2; $p = 0.01$) and a trend for a rise in minor amputations (6.6 \pm 6.3 vs 13.0 \pm 5.1; $p = 0.07$) between these cohorts. Five year mortality was 59% which was significantly higher in major amputation group than minor (63.9% vs 51.1%; $p = 0.02$). There was no difference between 'Early' and 'Late' cohorts in five year

total mortality (60.1% vs 57.4%; $p > 0.05$), major amputation mortality (63.2% vs 64.0; $p > 0.05$) or minor amputation mortality (43.9% vs 52.8%; $p > 0.05$).

Discussion: There has been no change in total mortality with time in subjects with diabetes who needs lower limb amputations.

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Use of a bedside foot assessment chart to increase uptake of foot checks for inpatients with diabetes

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Objectives: Inpatients with diabetes have a 2-fold increased risk of hospital acquired pressure ulcers of grade 2 or above. The question is can this excess burden be reduced by specifically targeting people with diabetes for pressure ulcer prevention. NICE guidance suggests that all inpatients with diabetes should have their feet checked and their risk of ulceration stratified within 24h of hospital admission. Data from the National Diabetes Inpatient Audit (NaDIA) in 2013 showed that at our institution only 20% of inpatients with diabetes received a foot risk assessment within such a timeframe.

Methods: We introduced a simple bedside foot assessment chart prior to the NaDIA in 2015 and provided teaching sessions to healthcare assistants, diabetes link nurses and doctors to encourage its use.

Results: The percentage of inpatients with diabetes receiving a foot risk assessment within 24h of admission improved from 20.4% to 58.3%, while the percentage that received a foot risk assessment during their inpatient stay rose from 26.5% to 72.9%. The percentage of patients admitted with active diabetic foot disease seen by the multidisciplinary diabetic foot care team (MDFT) within 24h improved from 77.8% to 100%. Preliminary data from this year's NaDIA show that we have maintained these improvements.

Conclusions: Introduction of a bedside foot assessment chart has led to a significant improvement in the proportion of inpatients with diabetes receiving a timely foot risk assessment, and has ensured that all patients admitted with active diabetic foot disease were seen by the MDFT within 24h.

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Bacterial profile and antibiotic resistance patterns in hospitalised patients with diabetic foot infection

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Aims: Studies on microbiological profiles of the diabetic foot have been based on a mix of outpatient and hospitalised-patient cohorts. We aimed to determine the bacterial profile and antibiotic sensitivity patterns specifically in those admitted to hospital with severe diabetic foot infection.

Methods: Retrospective review of 59 consecutive hospital admissions (Age 63 ± 9 years, 85% T2DM, HbA1c $8.9 \pm 2.1\%$) with a Texas Grade 3 ulceration and clinico-radiological evidence of osteomyelitis over a 9 month period. Deep swabs were taken at admission and bone samples, during debridement surgery. Multidrug resistant organisms (MDRO) were defined as those resistant to most available antimicrobial agents.

Results: A total of 118 specimens were included. Of the 144 organisms isolated, 43% were gram-positive and 44% gram-negative. Polymicrobial infection was found in 27.97% of specimens. Multidrug resistant organisms (MDRO) were encountered in 16/59 (27.1%) of patients and included ESBL producers (25%), MRSA (18.8%), VRE (25%), Morganella sp. (12.5%) Pseudomonas (7%) and Stenotrophomona sp. (11.8%) Carbapenem resistance (CRO) was noted in 7% of isolates. Worryingly, presence of MDRO did not correlate with duration of a ulceration ($p = 0.937$) or previous antibiotic therapy ($p = 0.94$).

Conclusions: The present study confirmed the high prevalence of multidrug-resistant pathogens in diabetic foot ulceration and concomitant osteomyelitis. The emergence of carbapenem resistance organisms is likely to be major future challenge. The problem requires a multi-focal approach, including providing education to both clinicians and patients, developing robust antimicrobial stewardship programmes and using new diagnostic and therapeutic technologies

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Audit on management and outcome of patients presenting with acute Charcot Neuropathy of foot and ankle to the Leeds Diabetes Limb Salvage Service

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Aims: To look at the management and outcome of patients presenting to the Leeds Diabetes Limb Salvage service with acute Charcot Neuropathy (CN)

Methods: All patients presenting with acute CN in 2014–2015 were identified from our diabetes database. Electronic records were examined to determine demographic details, time interval (TI) between onset of symptoms to offloading, offloading devices used and resolution times. We compared our data with that of National Charcot Foot Audit 2012 (CDUK)

Results: A total of 19 patients were identified M:F 14:5 Type 1: Type 2 diabetes 11:7.

Figures below are expressed as average (range)

Age 64.5 years (32–83) Duration of diabetes 18 (6–44) years

HbA1c 72mmol/mol (34–158)

15/19 patients had mid foot involvement

At outset 15 patients were offloaded with a removable device, 4 with irremovable cast (TCC) 18/19 patient achieved resolution of their CN .One patient died

(excluded from further analysis) .

CDUK resolution times for patients with non removable and removable devices were 9 and 12 months respectively compared to three and nine months for TCC and removable devices respectively in our series.

Time between onset of symptoms and presenting to the diabetes limb salvage clinic was 10 weeks (0.14–96)

Median resolution time for presentation $< / = 2$ weeks and > 2 weeks of symptoms was 3 and 5.5 months respectively

Conclusion: 1. Offloading within 2 weeks of symptoms and exclusive non removable casts use were associated with shorter resolution times

2. Resolution times in our series were shorter than that reported in CDUK

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Real time data on use of SINBAD grading in stratification of high risk neuro-ischemic diabetic foot disease and severity score in predicting amputations in a University Hospital

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Background and aim: NICE recommends use of a standardised system to document the severity of diabetic foot ulcer, such as the SINBAD. We audited the clinical effectiveness of SINBAD in our diabetic foot clinic, particularly the severity score in predicting amputations.

Methods: We retrospectively looked at 100 patients who attended the diabetic foot clinic from June 2015 to August 2015. After exclusion of patients with painful neuropathy and charcot's foot, we analysed data of 71 patients having diabetic foot ulcer. All patients had scoring as per SINBAD grading.

Results: The data of 71 patients was analysed, 53 male patients, average age of 63.4 years and average HbA1c of 67.9mmol/mol. In our cohort, 38% had SINBAD score ≤ 2 , while 62% had score of ≥ 3 . The rate of osteomyelitis was 21% (n15) in total with 87% (n13) having SINBAD score of ≥ 3 .

The amputation rate in our cohort was observed at 15.5%(n11) and 4.2%(n3) for minor (below ankle) and major (above ankle) amputations respectively. 85.7% (n12) of amputations were performed in patients having SINBAD score ≥ 3 , and all major amputations were seen with SINBAD score of ≥ 3 .

Conclusion: A SINBAD score of ≥ 3 was associated with increased incidence of osteomyelitis and amputations. A SINBAD score ≥ 3 strongly predicts future risk of amputation and hence these patients need to be managed with swift vascular assessment and intervention. At our centre, we closely liaise with vascular surgeons and discuss management of high risk patients in complex foot MDT.

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Outcomes of patients with diabetes and foot ulcers cared for in a multidisciplinary foot clinic including focus on cardiovascular risk factors

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Aims: Foot ulcers are associated with increased morbidity and mortality in patients with diabetes. In this study, we assessed the outcomes of patients referred to a multidisciplinary diabetes foot clinic at an inner city hospital in London, UK. Care provided included using a cardiovascular risk factor screening process during each visit, and a strong emphasis on reducing these risk factors.

Methods: We performed a retrospective analysis of patients with diabetes seen in a multidisciplinary diabetes foot clinic between 2005 and 2010. 5 year outcomes on re-ulceration, osteomyelitis, amputation and mortality rates were collected.

Results: 120 patients were seen in the clinic during the 5 year period (81% were male, mean age at first appointment \pm SD was 64 ± 13 , 89% had Type 2 diabetes). 25% of patients had evidence of osteomyelitis at the time of their first review. At least one amputation was undertaken in 18% of patients (15% minor and

3% major), while 3% required two or more amputations. Re-ulceration was seen in 38% of patients, 15% developed two or more new ulcers, and 8% developed at least three new ulcers during follow-up. 5 year mortality rate was 37%.

Summary: Multidisciplinary care has been shown to improve outcomes in patients with diabetic foot ulcers, although mortality and amputation rates remain high nationally. The 5 year mortality, major and minor amputation rate reported in our multidisciplinary clinic compares favourably with reported averages suggesting focus on cardiovascular risk factors may improve outcomes.

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Novel method of auto-photo elicitation and qualitative interviews in people with diabetes and active Charcot foot demonstrate the severe impact of diagnosis of a Charcot foot and its long-term management with total contact casting on patient's perceived quality of life and sense of wellbeing

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Aim: The aim of this research was to enhance the understanding of the lived experience of active Charcot foot in people with diabetes.

Method: We studied prospectively patients recently diagnosed with an active Charcot foot. We applied a novel method of auto-photo elicitation and qualitative interviews. Participants were asked to bring in 3-5 of their own photographs to demonstrate how the diagnosis and management of active Charcot foot had affected their lives. These photographs were used as the basis of a discussion in a semi-structured interview and evaluated using interpretive phenomenological analysis.

Results/Discussion: We interviewed 8 patients with diabetes and active Charcot foot (6 males and 2 females; age range 46-73 years; 2 with Type 1 and 6 with Type 2 diabetes). All patients were treated with total contact casting. Patients identified several areas of concern including non-recognition of symptoms and misdiagnosis, lack of available information, the challenges of acceptance, effects on diabetes, depression and suicidal thoughts, isolation, loss of meaningful activity and employment, changing sense of self, effects on relationships, and fear of the future. All patients saw being diagnosed with a Charcot foot as a marker of overall decline in health and wellbeing.

Conclusion: This is the first study that explored the patient's perspective of the lived experience of active Charcot foot and its treatment. It demonstrated that both the diagnosis of Charcot foot and its long-term management with total contact casting, had an immediate and severe impact on patient's perceived quality of life and sense of wellbeing.

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Early results from a technology-enabled integrated diabetes foot care service

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Aim: We describe our experience with developing and delivering an integrated diabetes foot service, using a new web enabled digital imaging and 3D measurement technology.

Method: Five Silhouette[®] digital wound cameras have been placed in relevant clinical areas (2 in the acute Trust, 3 community health centres) across two CCGs. All patients registered with the Trust specialist MDT foot clinic have digital images and clinical notes uploaded at every appointment. Data on ulcer size and ulcer healing progress is also generated. Once stable, patients are seen in community clinics by specialist podiatrists with distant monitoring support from consultants using the tele-capability of the system. Rapid escalation of patients back to the MDT, if necessary, is facilitated by the availability of data and reports across all settings and integration of the system with the Trust electronic medical record.

Results: 18 members of staff are now fully trained in the use of the system. In the first few weeks of use 35 patients were seen in community settings rather than the acute Trust with no deterioration in their condition. Data is being collected for health economic analysis, although initial health economic modeling forecasts significant reduction in costs to provide foot care to this cohort of patients.

Conclusion: This new system enables accurate analysis of wound healing and sharing of images and data across care settings. Remote monitoring of wounds with rapid escalation and de-escalation of care means that patients can be seen closer to home without any deterioration in their condition.

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Tangential hydrosurgical debridement: a potential role in major amputation avoidance for people with diabetes

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Introduction: Slow or non-healing wounds in people with diabetes contain dead, devitalised tissue and slough which is associated with bacterial overgrowth. Several debridement methods exist, management choice is dependent upon individual clinical circumstances and patient preference. We evaluated tangential hydrosurgical debridement (Versajet) as a method of final debridement in a high risk group.

Aims: Evaluate the utility and place in clinical practice of this method in a high risk group who had

- Undergone significant forefoot surgical debridement for an active infected diabetic foot ulcer.
- The resultant wound was poorly responsive to medical management, hence.
- Been formally listed for major amputation.

Results: Eight consecutive patients with diabetes were offered Versajet treatment. Seven with Type 2 diabetes, three patients were on renal dialysis. 5 male, 3 female; average age 61 years and average duration of diabetes 17 yrs. Average HbA1c for the group

61mmol/mol (range 37 – 78mmol/mol). Wound aetiology 3 ischaemic and 5 neuropathic. Major amputation was avoided in 6 of the 8 patients. Both patient in which the therapy failed were on dialysis. One patient who underwent a below knee amputation died within three months of surgery. Debridement occurred in the outpatient clinic for seven patients and for one treatment occurred in theatre. For three patients two episodes of hydrosurgical debridement was necessary.

Conclusion: Our small case series suggest that this method of rapid debridement can offer a potentially effective alternative to wound management in high risk patients. For those patient on renal dialysis the benefit is difficult to predict.

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Site-specific relationship between plantar ulcer sites and elevated peak plantar pressures

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Aims: The effect of elevated plantar pressures on foot ulcer risk has been reported only across the foot as a whole and not in relation to specific ulceration sites. The great toe is one of the most frequently ulcerated sites on the diabetic foot. We aimed to investigate peak plantar pressure at the great toe in diabetic patients with a previous great toe plantar ulceration and in patients with equally 'high-risk' feet, but with a previous ulceration at another plantar location.

Methods: Great toe peak plantar pressures were quantified during gait using PressureStat[™] in three age-matched groups: diabetic patients with neuropathy and plantar ulcer history at the great toe (DPN-UGT; n = 9); diabetic patients with neuropathy and ulcer history at other plantar sites (DPN-U; n = 6); matched controls without diabetes (C; n = 12).

Results: Plantar pressures at the great toe were significantly higher in DPN-UGT ($4.58 \pm 1.81\text{kg/cm}^2$) compared to both DPN-U ($2.36 \pm 1.09\text{kg/cm}^2$; $p = 0.001$) and C ($2.42 \pm 0.63\text{kg/cm}^2$; $p = 0.009$). There were no differences in plantar pressures at the great toe site between DPN-U and C ($p = 0.650$).

Conclusion: We demonstrate a site-specific relationship between previous ulceration and very high plantar pressures. 'High risk' diabetic patients with great toe ulcer history have highest great toe peak plantar pressures. Conversely, 'high risk' patients with ulcer history at sites other than the great toe have 'normal' great toe pressures, similar to controls. Specific plantar sites, identified in clinic with previous ulceration and elevated peak pressures, can be recommended to receive site-targeted offloading to protect against their re-ulceration.

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Forefoot transcutaneous oxygen (TcPO₂) Index is a more sensitive marker of peripheral vascular disease than ABPI or an isolated forefoot TcPO₂

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Background: Presence of peripheral vascular disease (PVD) in diabetes, which also worsens with ageing, has a significant negative impact on diabetes foot outcomes, but it is often diagnosed late.

Aim: To investigate the possible benefit of forefoot transcutaneous oxygen (TcPO₂) expressed as an index of forearm TcPO₂ in enhancing detection of early PVD in patients with diabetes.

Method: Measurements were taken from the forefoot and forearm for ABPI, TBPI, forefoot TcPO₂, forearm TcPO₂, and TcPO₂ Index (forefoot TcPO₂ divided by forearm TcPO₂). We compared measurements in patients with Type 2 diabetes vs participants without diabetes, and sub-analysed the impact of ageing and its correlation with non-invasive diagnostic parameters of PVD.

Results: Total of 68 participants, 78% with diabetes, and 22% without diabetes. Mean age 63 ± 12 vs 46 ± 11 years [p = 0.001]. There was no significant difference between their mean ABPI; 1.2 ± 0.4 vs 1.14 ± 0.31 [p = 0.104]. Mean forefoot TcPO₂ and TcPO₂ Index were lower in participants with diabetes, 47 ± 15mm Hg vs 64 ± 7mm Hg [p = 0.001] and 0.78 ± 0.24 vs 0.91 ± 0.09 [p = 0.003] respectively, but participants with diabetes had significantly negative correlation of forefoot TcPO₂ with ageing r = -0.306, which becomes stronger when expressed as an index of the forearm TcPO₂ (r = -0.469).

Conclusion: ABPI does not identify early PVD in participants with diabetes. TcPO₂ Index is a more sensitive marker than an isolated forefoot TcPO₂ in detecting PVD. Thus this ought to be considered as an alternate means of an early and objective non-invasive diagnostic parameter for PVD to identify patients for further investigations or monitoring.

P350

Diabetes care in an orthopaedic led foot clinic

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Aim: The NHS spends several million pounds on 7,000 diabetes related amputations a year; 80% of these are preventable. Prevention requires tight glycaemic control and optimisation of contributory risk factors. We aimed to evaluate the diabetes care received by patients attending an orthopaedic-led foot clinic for management of diabetic foot disease.

Methodology: Data was collected using a standardised proforma for 38 patients attending clinic over a 7 week period. Microsoft Excel was used for analysis.

Results: 29 patients (76.3%) had diabetes (17.2% Type 1 diabetes, 82.8% Type 2 diabetes) with mean HbA1c of 77.2mmol/mol. 13.8% had good glycaemic control (HbA1c < 53mmol/mol). 79.3% required insulin to manage diabetes.

100% had previous foot disease and 69.0% had a previous amputation. 89.7% had peripheral neuropathy and 34.5% had peripheral vascular disease. Other diabetes related complications present were hypertension (75.9%), ischaemic heart disease (31.0%), cerebrovascular disease (20.7%), retinopathy (62.1%), and chronic kidney disease (34.5%). 17.2% were current smokers.

In the preceding 12 months 82.8% had HbA1c measured and 44.8% had lipid profile checked. 65.5% were on a statin. Only 31.0% had their diabetes managed by a diabetes specialist.

Conclusion: Patients with diabetic foot disease have poor glycaemic control, modifiable risk factors and multiple complications, making their care needs complex. Their diabetes management does not seem to receive the attention it merits. We believe these patients should be looked after in a multidisciplinary foot clinic as recommended by NICE if we wish to succeed in preventing recurrent foot disease.

P351

The need for more open access to specialist diabetes foot care services: supported by high appointment complexity score for new self-referred patients

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Background: Patients with diabetes foot problems ought to have rapid access to foot care teams. Our clinic offers an open access policy, allowing patients to self-present directly to our specialist foot care service.

Aim: To evaluate the complexity of self-referred patient visits compared to other sources of new-referrals.

Method: New patient visits were reviewed over a six month period. A "visit complexity score" (VCS) is calculated to reflect all investigations and interventions carried out during the consultation. Each activity is given a point score between 0 and 6 depending on its complexity (e.g. 0 for foot checks without procedures, 1 for debridement of callus, 4 for drainage of pus, 6 for minor amputation). A sum of all activity points equates to the VCS. Referral source were divided into four groups: Self-referred, Community Podiatrist, Secondary Care or GP. The VCS and patient characteristics were compared between groups.

Results: There were 219 new-patient referrals. Of those with complete data, 4% were self-referred with a significantly higher mean VCS of 6.2 ± 2.4points compared to the overall mean 4.1 ± 2.3points [p = 0.025]. The remaining referrals were 8% community podiatry, 40% secondary care and 47% from GPs all demonstrated a lower mean VCS when compared to the self-referred groups calculated as 4.4 ± 2.1, 4.4 ± 2.5 [p = 0.040] and 3.9 ± 2.2points [p = 0.013] respectively. No significant difference was identified between mean ages or HbA1c.

Conclusion: Self-referred patients had higher visit complexity scores, thus their decision to self-present was well justified. More of such open access appointments ought to be offered to facilitate rapid access to specialist diabetes foot care.

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High prevalence of cognitive and non-depressive psychiatric comorbidities in those admitted to hospital with diabetic foot disease

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Aim: The high prevalence of depression is well recognised in diabetic foot disease (DFD). However, the prevalence and impact

of significant cognitive and non-depressive psychiatric comorbidities (C/NDPC) in DFD has not been well documented. We aimed to explore this in a cohort admitted to hospital for the management of DFD.

Methods: Analysis of 90 individuals, prospectively collated over five months, hospitalised with DFD at a single centre. C/NDPC was considered present if there was a pre-existing diagnosis of a cognitive or an ICD-10 Classification of Mental and Behavioural Disorder/s apart from depression (F32-38). Differences in characteristics between participants were tested using unpaired *t*-test and odds ratio calculated where necessary.

Results: Overall, the group was predominately male (75%) with an average age of 61 ± 13 years and HbA1c of $8.8 \pm 3.4\%$. 37% (33/90) had C/NDPC of which 30% (10/33) had dementia. Those with C/NDPC were younger (59 years vs 62 years ($p = ns$), had higher HbA1c 9.3% vs 8.2% ($p = 0.05$) and presented more often through the emergency department (61% vs 43%, $p = 0.11$). There were 3 major amputations in the C/NDPC group, while there were none in those without. Not unsurprisingly, those with C/NDPC had a longer length of stay (48 ± 59 vs 33 ± 12 days, $p = 0.02$), required greater therapy input (178min/week vs 110min/week, $p < 0.05$) and were twice as likely (odds ratio 1.98 $p = 0.04$) to have housing/placement issues.

Conclusions: We establish a high prevalence of C/NDPC amongst those hospitalised with DFD. These patients a present significant clinical challenge and demonstrate inferior outcomes. This underscores the need for continued multidisciplinary involvement including strong psychosocial support.

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Still room for improvement in the management of diabetes foot ulceration: learning from a retrospective study of 100 cases selected at random from caseloads in Northern Ireland

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Aims: To optimise care and inform service planning we set out to determine the number of people without diabetes, with diabetes and with diabetes foot ulceration (DFU) on Podiatry caseloads. Management of DFUs was mapped against national standards.

Methods: A descriptive retrospective cohort comprised of those with and without diabetes and those with DFUs was identified in 2013–2014. Subjects ($n = 100$ including pilot study, $n = 25$) were randomised electronically from caseload lists. Data were collected on diabetes status, assessment, risk assignment, DFU classification, healing time, ulcer prevention and amputation rates. Practice was assessed against NICE guidelines and Putting Feet First.

Results: The Podiatry caseload was 136,808, including 53,590 people with diabetes and 2,468 had a DFU (4.6%). Average diabetes duration in DFU patients was 17 years with an average HbA1c of 70.9mmol/mol. Neuropathy and foot pulse assessment was completed in 60% and 64% people respectively. Foot risk was classified and assigned in 72% and 74% had a review date appropriate to DFU risk. All had management plans documented and 54% had all elements of a DFU classification system completed. Footwear assessment was completed in 84%. At 12 and 24 weeks 57% and 74% of DFUs had healed and 41% remained ulcer free 12 months from healing. Thirteen patients had an amputation and seven were deceased at 24 weeks.

Conclusion: We recommend that diabetes foot assessments, risk assessment, risk assignment and review be standardised and improved regionally. A regional DFU classification system has been agreed and will become embedded in Podiatry practice.

P354

Role of admission time deep swab specimens in the management of acute severe diabetic foot osteomyelitis

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Aim: Our study aimed to evaluate if deep swab cultures taken at time-point of a hospital admission with a severe diabetic foot infection could reliably identify pathogens compared to cultured bone specimens.

Method: Retrospective review of consecutive hospital admissions with a severely infected diabetic foot, Texas Grade 3 ulceration and clinico-radiological evidence of osteomyelitis over a 9 month period. A deep swab (DWS) was taken at time of admission. Bone sampling was undertaken during surgery (SBS). The number of positive growths per individual per sampling technique was then determined and data is represented as such.

Results: A total of 59 subjects (average 60.79 ± 13.61 years, 75% male, 85% Type 2 diabetes, HbA1c $8.9\% \pm 2.15$) met the inclusion criteria. 49% of wounds were chronic. 25% of patients had been on long-term antibiotic treatment. Of the 59 patients, 42/59 (73%) of DWS and 50/59 (85%) of SBS were positive. Mean number of organisms isolated by DWS was significantly lower than with SBS (1.23 ± 0.57 vs 1.68 ± 0.79 individual, $p = 0.000$). On comparing the cultures of DWS and SBS, the cultures were strictly identical in 9 cases (15.25%) and at least one bone pathogen was grown in the corresponding DWS in 11 cases (18.6%). There was fair concordance in growth between the techniques ($\kappa = 0.344$). *Staphylococcus aureus* and MRSA showed the highest concordance ($\kappa = 0.591$ and $\kappa = 0.556$, respectively).

Conclusion: This study confirms the poor reliability of the deep swab technique in isolating all the pathogens causing osteomyelitis. Early bone sampling should remain the mainstay of guiding antibiotic therapy.

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Cost benefits of an integrated diabetic foot service

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Background: Brent has the lowest total diabetes amputation rate in England. The Central Middlesex Hospital (CMH) acute multidisciplinary foot has been credited with these results. Management focuses on targeted antibiotics and outpatient parenteral antibiotic therapy (OPAT). However, comprehensive cost savings from such a service remains to be established as previous studies only consider limited costing factors.

Aim: To cost a year of care for high risk diabetic foot complications and the potential cost savings of a multidisciplinary OPAT diabetic foot service.

Methods: Retrospective analysis of all patients with new high-risk ulcers (SINBAD > 3) or acute Charcot foot presenting to the CMH acute foot service between 1/04/2014–31/03/15 to 31st

March. Sixteen costing factors including consumables (eg antibiotics, dressings, orthotics), health professional time (including community staff), transport, imaging and line insertions. Cost savings were calculated by comparing the marginal cost of the service to estimated savings from averted amputations, relative to comparable Clinical Commissioning Groups (CCGs).

Results: Seventy-eight consecutive patients: mean age 67.4 years 71 ulcers, 9 acute Charot's (2 with ulcers). Median treatment time:

7.5 months. The marginal cost of the service was estimated at £98,000/year. Savings from averted amputations, relative to the 10 most similar CCGs, are estimated at £155,000.

Discussion: This is the first detailed economic analysis of the costs of a highly effective multidisciplinary OPAT foot service. There is a national target of 50% fewer amputations by 2018. A detailed understanding of the service requirements and their associated costs is essential if this is to be achieved.

Clinical care and other categories posters: hypoglycaemia

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Impact on hypoglycaemia awareness of real time continuous glucose monitoring and intermittent continuous glucose data (I HART CGM)

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Refer to Oral number A68

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A retrospective observational study of patients with Type 1 diabetes with self-reported severe hypoglycaemia reveals high level of ambulance attendance but low levels of therapy change and specialist intervention

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Aims: To describe the NHS resource utilisation associated with self-reported severe hypoglycaemic events in patients with Type 1 diabetes.

Methods: An observational, multi-centre, retrospective study of patients with Type 1 diabetes was conducted in 10 UK NHS hospital diabetes clinics. Adult patients (> 18 years) with Type 1 diabetes, insulin-treated for ≥2 years, experiencing ≥1 self-reported severe hypoglycaemic event in the previous 24 months (observation period) consented to retrospective data collection from medical records.

Results: Eighty-five patients (59% male; mean age 57.0 [SD:14.8] years) reported 140 episodes of severe hypoglycaemia during the 2-year observation period; 74% were treated with basal-bolus insulin analogue regimes and 92% had ≥1 comorbidity. Of 140 episodes, 59% involved ambulance call-out only, 8% involved ambulance to Accident and Emergency (A&E), 4% involved ambulance to A&E and inpatient admission, 7% involved A&E only, 1% involved other hospital intervention and 21% required no emergency intervention. Only 7% (n = 8/119) of HbA1c measurements recorded closest prior to severe hypoglycaemic

events were < 50mmol/mol (6.7% DCCT-aligned). Patients attended a median of 5 (range:0–58) diabetes clinic visits during the 2 year observation period (13% severe hypoglycaemia-related). A median of 0 (range:0–11) diabetes therapy changes/patient were recorded during the observation period; hypoglycaemia was the most commonly recorded reason for therapy changes (44% [52/119 changes]).

Conclusions: We observed a high level of ambulance service intervention but surprisingly low levels of hypoglycaemia follow-up, therapy change and specialist intervention in patients self-reporting severe hypoglycaemia. These findings may highlight important issues in the diabetes care pathway.

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A pilot project assessing the feasibility of an integrated hypoglycaemia pathway for patients not conveyed to hospital following treatment by the ambulance service for a severe hypoglycaemic episode

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Introduction: A three month retrospective audit identified 3 out of 6 patients treated for a hypoglycaemic episode by the ambulance service were not conveyed to hospital.

Aim: To assess the feasibility of an integrated pathway between ambulance service, acute diabetes trust, patients and general practice.

Objectives: Measure numbers referred over 3 months

Identify outcome of the telephone consultation

Identify intervention

Ascertain onward referral

Identify resources required and potential savings

Method: Project group agreed design, clinical governance accountability and consent for alteration in service contract for the pilot period

The ambulance service forwarded a hypo notification

A specialist diabetes nurse made telephone contact within 42h

On completion the hypo notification and consultation outcome was sent to the general practitioner

Results: 11 referrals, 10 successful telephone contacts

Classification

Type 1 diabetes – six patients

Type 2 diabetes – four patients

Pancreatitis - one patient