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Short Report: Complications

Hypercholesterolaemia screening in Type 1 Diabetes: a difference of opinion

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Abstract

Aim To assess cholesterol screening of children with Type 1 diabetes by diabetes professionals using a survey of current practice, given that National Institute of Health and Care Excellence guidelines on childhood Type 1 diabetes do not recommend cholesterol screening, yet the National Paediatric Diabetes Audit has an annual cholesterol measure (> 12 years) as a key outcome indicator.

Methods An online survey was sent to 280 members of the Association of Children's Diabetes Clinicians to assess cholesterol screening practice in children.

Results A total of 87 diabetes professionals (31%) responded. The results showed that 94% of respondents measured cholesterol, 33% did this annually on all children, and 7% measured fasting cholesterol. A total of 63% used no guidelines to decide treatment or further investigation. The definition of 'high' cholesterol varied from > 4.5 to > 8 mmol/l, with 40% giving no response or specific level. Only 14% of clinicians had started statin therapy in their diabetes clinic in the previous 5 years.

Conclusion Whilst the majority of diabetes professionals measured cholesterol in children with Type 1 diabetes, there was marked variability in sampling, in children screened and in action taken if levels were considered abnormal. It is debatable whether cholesterol measures should be undertaken, certainly more than once, and whether cholesterol level should feature as a key outcome in the national audit in future.

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Introduction

Screening for diabetes complications and associated conditions forms part of the annual clinical review for Type 1 diabetes in childhood and adolescence. The UK National Institute for Health and Care Excellence (NICE) guidelines for the management of children and young people with diabetes (NG18), 2015 [1] do not include cholesterol screening. In adults, screening for hypercholesterolaemia in both Type 1 and Type 2 diabetes is recommended on an annual basis to reduce the risk of associated cardiovascular complications [2]. In the paediatric population, there is limited evidence to support routine cholesterol screening. One systematic review suggests cholesterol testing at diagnosis and, if normal, then again during puberty [3], but others oppose cholesterol screening routinely in children, stating concerns that a high result could be psychologically damaging and that there is a lack of evidence that treatment would reduce cardiovascular risk in the long term [4]. Annual cholesterol measurement for children aged > 12 years, however, forms one of the seven core care processes outlined in the National Paediatric Diabetes Audit (NPDA) [5]. In the 2014–2015 audit, 60.8% of children aged > 12 years underwent a cholesterol measurement. Thus, there appears to be a disconnect between national guidance for cholesterol screening and audit requirement, which is unhelpful for clinical practice. We aimed to assess cholesterol screening amongst diabetes professionals using a survey of current practice.

Methods

Members of the Association of Children's Diabetes Clinicians were contacted by email and asked to complete a

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What's new?

- Annual measurement of cholesterol in children aged > 12 years with Type 1 diabetes is one of the seven core care processes outlined in the National Paediatric Diabetes Audit (NPDA).
- The National Institute for Health and Care Excellence (NICE) guidelines (NG18) for management of children and young people with diabetes 2015, do not include cholesterol screening for children with Type 1 diabetes.
- There is much variation in cholesterol measurement, evaluation and treatment among clinicians looking after children with Type 1 diabetes.
- We suggest further evidence is needed on the utility of cholesterol screening in the paediatric population, and consistency is needed between NICE guidance and NPDA standards.

questionnaire via the website *Survey Monkey*. Members of the association include consultants, registrars and clinical nurse specialists based in the UK. The survey asked members about their use of cholesterol screening (the survey questions are provided in Table S1). Permission for distribution was kindly agreed and subsequently circulated by the chair of the Association. In total, 280 members were emailed in November 2015, and a further reminder email was sent in January 2016.

Results

Of the 280 members emailed, we received 87 responses, a response rate of 31%. Of those who responded to the survey, 94% measured cholesterol. With regard to the method of testing, 7% used fasting samples routinely, 17% used fasting samples only if the random measurement was high, and 41% used only non-fasting samples (Fig. 1). Some professionals used a range of measurements in practice; 26.4% used a fasting sample only if the random measurement was high, otherwise they used a non-fasting sample, while 1.1% used either fasting or non-fasting samples.

A total of 33% of professionals measured cholesterol levels on all children (i.e. those aged > 12 years and those aged < 12 years) every year, with 40% using annual measurements only in the > 12-year-old population.

In addition to total cholesterol, 67% also measured triglycerides, HDL and LDL cholesterol levels, 9.2% measured only triglycerides in addition, while others also measured a combination of triglycerides and HDL cholesterol (6.9%), triglycerides and LDL cholesterol (3.4%) or HDL and LDL cholesterol (3.4%). A total of 9.2% solely measured cholesterol.

A total of 63% of professionals did not use any guidelines to decide treatment or further investigation, compared with

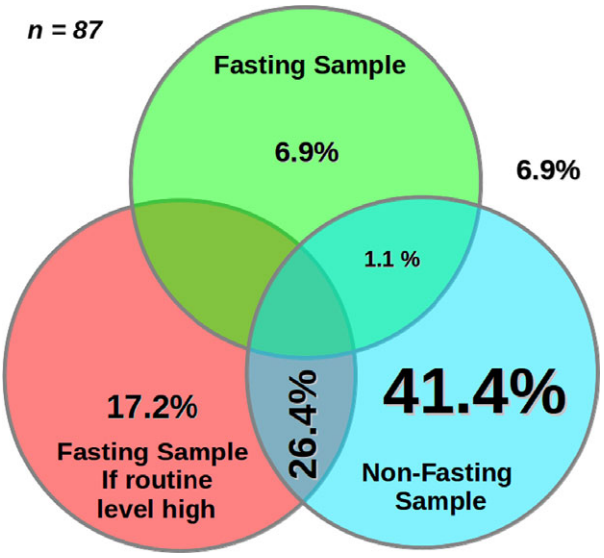

FIGURE 1 Means of cholesterol measurement in children with Type 1 diabetes.

29% who did (8% provided no answer). Guidelines used included: NICE guidelines (24%), International Society for Paediatric and Adolescent Diabetes (ISPAD; 24%), local guidelines (16%), 'Simon Broome criteria' (8%), American Diabetes Association (8%), American Academy of Pediatrics (4%), American Heart Association (4%), British Heart Foundation (4%) and other (8%).

The reported level of total cholesterol and LDL that would prompt further action varied. For those who stated they did not use a guideline, responses relating to total cholesterol level ranged from no response (24%), no specific level (16%), and levels > 4.5 mmol/l (3.6%), > 5 mmol/l (22%), > 5.5 mmol/l (7.3%), > 6 mmol/l (12.7%), 6.7 mmol/l (3.6%), > 7 mmol/l (9%) and > 8 mmol/l (1.8%). Action after observing an above-threshold cholesterol level included referral to a dietician (42% of respondents), referral to a lipidologist (14%) and commencement of a statin (2%). A total of 16% of respondents would refer to a dietician and lipidologist, 10% would refer to a dietician and commence a statin, 3% would refer to a lipidologist, dietician and commence a statin, and 13% of professionals would not take any further action.

Only 14% of clinicians reported that a child with diabetes was started on statins in their clinic in the previous 5 years, with the number of cases reported per clinician varying between one and six children (median = 2). The number of children reported to have had high LDL or total cholesterol levels varied from 0 to 50 children per clinician (median = 0).

Discussion

Despite annual screening for cholesterol not being included in NICE guidelines, 94% of clinicians surveyed measured

cholesterol routinely, probably largely because such screening is included in the NPDA 'essential' seven care processes. Only a minority (6%) followed NICE guidance and did not routinely measure cholesterol. Furthermore, amongst clinicians who measured cholesterol, there was much variation in practice regarding who was screened and which test was used.

Evidence to support the screening of cholesterol in the paediatric population is limited. An analysis of three systemic reviews concluded that practice may include measuring lipids 6 months after diagnosis and, if normal, then again in puberty [3]. Even compared with this more proactive approach, a third of clinicians would be considered to be over-investigating for dyslipidaemia by testing in all age groups annually.

The SEARCH for Diabetes in Youth case–control study showed that, in young people with Type 1 diabetes, even with a short disease duration, glycaemic control influenced lipid profiles [6]. Those with optimum diabetes control (defined as HbA_{1c} 58 mmol/mol or < 7.5%) had similar lipid profiles to those of young people without diabetes. Those with suboptimum control (defined as HbA_{1c} > 58 mmol/mol or > 7.5%) had a higher prevalence of lipid abnormalities compared with the control group. A key issue for national policy-makers when deciding on advice about screening for hypercholesterolaemia is the lack of randomized controlled trials in children and young people. The results of the AdDIT trial [7], which randomized children with Type 1 diabetes and microalbuminura to receive either an angiotensin-converting enzyme inhibitor, a statin, combination therapy or placebo for 3–4 years, may help inform the debate on the efficacy and safety of statin treatment in this age group. Although the primary outcome was improvement in microalbuminuria, secondary outcomes included measures of cardiovascular health and lipid profiles.

The perceived level of abnormality of cholesterol varied from levels > 4.5 mmol/l to > 8 mmol/l, with many professionals unsure of the level considered abnormal. This lack of consensus amongst professionals means there is wide variation in the level that would trigger further investigations, referral to other professionals and treatment. The lack of clarity on acceptable lipid limits and what is the appropriate treatment is not unique to the UK, being seen internationally with a wide range of thresholds across multiple international guidelines [8]. The two most popular guidelines used by professionals were the ISPAD consensus guideline where an elevated LDL cholesterol level is defined as ≥ 2.6 mmol/l (100 mg/dl) and NICE Familial Hypercholesterolaemia guideline (CG71), where a total cholesterol concentration of > 7.5 mmol/l is cause for further investigation and possible treatment.

A response rate of 31%, leaves 69% of the membership of the professional body whose views are not reflected in the present results. The views and practice of 87 professionals working with young people across the UK remains a useful barometer to understand practice, but may not be indicative of precise treatment at the individual patient level. However, as 61% of children aged > 12 years had their cholesterol measured, according to the last NPDA report [5], the present findings suggest it is still a part of many professionals' clinical practice. A more robust assessment of cholesterol management would be to collect national data on actual levels of screening (already carried out in the NPDA), the number of statin prescriptions issued and referrals to dieticians and lipidologists. This is beyond the scope of the present study, but could form the basis of future work as part of a later NPDA survey.

The cost implications of routine cholesterol screening across the National Health Service is significant, given that there are currently 26 364 under 19-year-olds with Type 1 diabetes in the UK [5]. Considering the cost of indiscriminate annual screening, and the low yield of abnormal results from this process, a more measured and targeted approach is indicated.

Further research into the use of cholesterol screening in the paediatric population is needed, including assessing any impact on long-term cardiovascular health. With such variation in the guidance used and in what is considered an abnormal cholesterol result, it is imperative that clinicians have agreed national guidance for managing hypercholesterolaemia in childhood Type 1 diabetes. Certainly, some clarity is needed for clinicians, with some continuity of advice between NICE guidance and the NPDA audit standards.

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Competing interests

None declared.

Disclaimer

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Survey questions.