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The use of computer programs to support clinical decision-making could improve results in the management and follow-up of diseases like Childhood Type 2 diabetes

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English key words: diabetes *mellitus*, decision support techniques, child, adolescent.

Palabras clave en español: diabetes mellitus, técnicas de apoyo para la decisión, niño, adolescente.

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The use of computer programs to support clinical decision-making could improve results in the management and follow-up of diseases like Childhood Type 2 diabetes

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Abstract

Authors' conclusions: the use of computerized clinical decision support system to automate the identification and screening of pediatric patients, at high risk for type 2 diabetes *mellitus*, can help overcome barriers to the screening process by increasing screening among patients at risk and adherence to follow-up appointments.

Reviewers' commentary: the use of the computerized support system described does not seem to provide substantial advantages for the screening and follow-up of older children and adolescents at risk of type 2 diabetes *mellitus*, although it does improve the adequacy to the criteria of good clinical practice.

Key words: diabetes *mellitus*, decision support techniques, child, adolescent.

Usar programas informáticos podría mejorar el seguimiento de enfermedades como la diabetes tipo 2

Resumen

Conclusiones de los autores del estudio: el uso de un sistema informático de apoyo clínico que automatice el proceso de identificación y cribado de pacientes pediátricos en riesgo de padecer diabetes de tipo 2 ayuda a superar barreras en dicho proceso: aumenta el número de pacientes estudiados y mejora la adherencia durante el seguimiento.

Comentario de los revisores: el uso del sistema de apoyo informático descrito no parece aportar sustanciales ventajas para el cribado y seguimiento de niños mayores y adolescentes con riesgo de diabetes *mellitus* tipo 2, aunque sí mejora la adaptación a los criterios de buena práctica clínica.

Palabras clave: diabetes *mellitus*, técnicas de apoyo para la decisión, niño, adolescente.

STRUCTURED ABSTRACT

Objective: to determine the feasibility and actual effectiveness of a computerised system (CHICA T2D) to assess risk, coordinate screening for and diagnose type 2 diabetes (T2D) in at-risk children aged more than 10 years and adolescents.

Design: cluster-randomised clinical trial.

Setting: 4 primary care clinics in Indianapolis (Indiana, USA).

Study sample: all children aged more than 10 years that received care in the clinics between January 2013 and December 2016. Participants were cluster-randomised to the

control group (CG) or intervention group (IG) based on the clinic they attended. The IG underwent screening and was followed up through the computerised system (CHICA DM2) and the CG was managed conventionally. A body mass index (BMI) at or above the 85th percentile was considered a risk factor for T2D. Patients with no documented BMI were excluded from the study. Patients with a BMI at or above 85th percentile were eligible for screening if they had two additional risk factors.

Outcome measures: the primary outcome was the percentage of youths identified as being at risk for T2D. The secondary outcome was the percentage of youths that had

laboratory tests performed and completed the screening process. The authors analysed the association between the intervention and the likelihood of completing the workup. Outcomes were adjusted for age, sex, race, and type of insurance when there were differences between groups in these covariates.

Main results: of a total of 1423 patients, 54 (3.8%) were excluded due to missing BMI data. The analysis included 1369 youths (52% male), with a median age of 12.9 years (interquartile range, 11.2–15.3): 684 in the IG and 685 in the CG. Of all participants, 49.1% in the CG and 55.1% in the IG were black; 35.5% in the CG and 28.1% in the IG were Hispanic; and 8.6% in the CG and 8.1% in the IG were white.

In the study, 663 (48.4%) patients had a BMI at or above the 85th percentile, of who 565 (41.3%) had two or more additional risk factors for T2D: 282 in the CG (41.2%) and 283 (41.3%) in the IG. Thus, when it came to the primary outcome there were no differences in the identification of children with risk factors for T2D.

As for the secondary outcome, a total of 115 children (20.4%) underwent testing (fasting plasma glucose or haemoglobin A1c): 26 (9.2%) in the CG and 89 (31.4%) in the IG. The adjusted odds ratio (OR) for screening in the IG was 4.6 (95% confidence interval [95 CI]: 1.5 to 14.7) compared to the CG.

The proportion of patients that attended follow-up appointments was higher in the IG (29.4% in IG vs 18.9% in CG), with an OR of 1.8 (95 CI, 1.5 to 2.2).

Conclusion: the use of a computerised system to automate the identification and screening of patients at risk for T2D was useful, with increased testing of patients that met the risk criteria and an improved followup.

Conflicts of interest: none disclosed.

Funding sources: grant from the National Institute of Diabetes and Digestive and Kidney Diseases. There were other funds obtained from awards.

COMMENTARY

Justification: while the prevalence of T2D in the paediatric population is low, it can reach up to 2.1% in European adolescents, and a worrisome increase is expected due to the epidemic proportions of childhood obesity, which is associated with its development.¹ It is well known that the main risk factor for T2D is excess weight. Thus, it would be sensible to develop screening programmes for the obese population.²

Validity: the population under study was well defined, but the sample was limited to four specific clinics. The criteria and risk factors for T2D, while not specified, were those established by the American Diabetes Association. The intervention

was clear, and there was a detailed explanation of every step in the computerised system. The outcome measures were clearly defined, but the most relevant finding of the study was the odds ratio (OR) for undergoing screening, which was not defined a priori.

Patients were randomised by clusters based on the clinic they attended, and there were no data regarding the clinicians that participated in the study, which were 29 in total. The authors analysed data to verify that the groups of patients had similar characteristics, and intended to adjust the analyses for race, sex or type of insurance if they found differences between groups. Blinding was not possible due to the characteristics of the software. There were no losses to followup in the final analysis. The analysis was made by intention to treat.

As for external validity, the results of this study cannot be extrapolated to our population due to the ethnic composition of the sample. In our health care centres, we only serve children up to age 14 years, so the yield of screening would probably be even lower.³

Clinical relevance: the usual proportion of patients were identified as being at risk of T2D using CHICA T2D system (approximately 41% of patients in the CG and IG), which suggests that these patients are identified properly under any circumstances. The percentage of patients that completed the workup was 20%, which seems low. However, the likelihood of completing the workup was 4.6 higher in the IG, with a number needed to treat (NNT) of 5*. The final yield for the diagnosis of T2D (1 patient) or prediabetes (18 patients) was higher in the control group, with an OR of 0.6 (95 CI, 0.3 to 1.1). The study did not analyse whether early diagnosis improved long-term outcomes.

There is evidence that suggests that outcomes improve when computerised clinical support systems for clinicians are combined with support for self-guided behaviour change for families.⁴

In any case, including an additional screen or popup in an application that is used routinely in the care of the paediatric population seems a simple, cheap and risk-free measure that could be beneficial to our patients.

Applicability to clinical practice: at present, when most primary care clinicians work with electronic health record systems, integrated clinical support algorithms offer unquestionable benefits to health professionals as well as patients. However, this study did not seem to find evidence that the use of CHICA T2D offered substantial advantages. Current evidence suggests that primary prevention measures aimed at promoting lifestyle changes may be more cost-effective.^{2,4}

* Value calculated by reviewers based on original data.

Conflicts of interest: the authors of the commentary have no conflicts of interest to declare.

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