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Original article

Screening for gestational diabetes in the Lombardy region: A population-based study

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Abstract

Aim. – As the treatment of hyperglycaemia during pregnancy with diet or insulin reduces the risk of adverse maternal outcomes and perinatal complications, screening for gestational diabetes mellitus (GDM) is included, albeit to variable extents, in all guidelines of care for pregnant women. The aim of the present investigation was to estimate the proportion of pregnancies screened for GDM in Lombardy between 2007 and 2010, and to identify predictors of screening.

Methods. – A retrospective cross-sectional study using regional healthcare utilization databases of Lombardy was conducted. The study included all residents of Lombardy without pregestational diabetes who delivered between 1 January 2007 and 31 December 2010. The proportion of pregnancies with at least one screening test for GDM was calculated, along with the odds ratios and 95% confidence intervals associated with selected covariates for GDM screening.

Results. – Of the 362,818 pregnancies included in the sample, 30% were screened for GDM. The proportion of pregnancies screened increased slightly from 2007 (27%) to 2010 (33%) and with maternal age (from 28% among women < 25 years to 32% among those ≥ 35 years), and varied widely across local health management organizations (HMOs) of residence (range: 20% to 68%). Socioeconomic indicators (education, immigrant status), obstetric history and prepregnancy hypertension were independent predictors of GDM screening.

Conclusion. – The study finding of a low rate of pregnant women screened for GDM among residents of Lombardy supports the need for programmes to improve training of healthcare professionals, to raise women's awareness of GDM and to eliminate barriers to GDM screening.

Keywords: Gestational diabetes mellitus; Oral glucose tolerance test; Screening; Predictors; Cross-sectional study; Healthcare utilization databases

1. Introduction

Gestational diabetes mellitus (GDM) has been defined as "any degree of glucose intolerance with onset or first recognition during pregnancy" [1]. GDM is associated with an increased risk of adverse pregnancy outcomes for both the mother and child (such as preeclampsia, prematurity, caesarean section, macrosomia and neonatal hypoglycaemia) [2–4]. GDM also affects women and their children well beyond delivery. Compared with women without a history of GDM, women with a pregnancy complicated with GDM have a sevenfold increased risk of developing type 2 diabetes (T2D) in the years following childbirth [5].

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Moreover, children of mothers with GDM have an increased risk of developing obesity in childhood and adolescence, as well as GDM and T2D later in life [1,2,4,6–8].

Identifying women with GDM is important, as treatment of hyperglycaemia during pregnancy with either diet or insulin greatly reduces the risk of serious perinatal complications [9] and, less consistently, maternal outcomes [9–12]. Screening is essential for diagnosing GDM, as hyperglycaemia is usually mild and non-symptomatic [10]. In Europe, GDM is most often reported as affecting 2–6% of pregnancies [13]. However, more extreme values (ranging from 1% to 28%) have been observed in specific countries, depending on their sociodemographic characteristics, prevalence of diabetes and screening policies [13]. In 2010, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) suggested significant changes to diagnostic criteria that were likely to increase the proportion of pregnancies with GDM to 18–20% [1,14].

Even though no universal consensus on screening procedures or diagnostic criteria has yet been reached [2,15–17], in almost all Western countries, including Italy, national healthcare providers and professional associations recommend screening for GDM in either all pregnant women (universal screening) or only those at increased risk of GDM [11,13,18–22]. Yet, it is unknown as to what extent recommendations for GDM screening are implemented [13], given the very limited information available in the literature on the proportion of pregnancies screened for GDM at the population level [23]. Therefore, the present cross-sectional study was conducted to estimate the proportion of pregnancies screened for GDM in Lombardy between 2007 and 2010, and to identify screening predictors, with the use of regional healthcare utilization (HCU) databases.

2. Materials and methods

2.1. Data sources

The data analyzed in this retrospective cross-sectional study were retrieved from the electronic HCU databases of Lombardy, the largest region of Italy with nine million residents, 16% of the Italian population. The Italian National Healthcare Service (NHS) [24] provides full coverage to all residents for general practitioner (GP) care and hospitalizations, and coverage with copayment for diagnostic procedures and laboratory tests, specialist care and drug prescriptions. Exemptions from copayment are granted based on age or income, or for selected diseases or conditions. The delivery of NHS services to its beneficiaries is tracked using a system of HCU databases that includes:

- an archive of NHS beneficiaries (practically the entire resident population), and their demographic and administrative data;
- a hospital-discharge database, covering all discharges from public and private hospitals in Lombardy;
- a dispensed-drug database, containing information on the drugs dispensed through the NHS;
- a database of exemptions from copayment with the date granted;
- an archive of outpatient diagnostic imaging and laboratory tests provided to beneficiaries;
- a database of certificates of care at delivery (CEDAP), including information on the pregnancy, delivery, newborns and parents.

The CEDAP is a nationwide mandatory questionnaire completed by the midwife or physician attending the delivery. Twice a year, the Ministry of Health issues a report based on the analysis of CEDAP data to guide planning of maternal services.

Because healthcare coverage in Italy is universal, these databases provide complete and comprehensive information on all diagnostic procedures and laboratory tests, specialist care and prescription drugs provided to the entire population, and constitute a unique source of data for population-based epidemiological studies [25–29]. For every NHS beneficiary, information from different databases can be linked together through a non-informative identifier.

2.2. Cross-sectional sample

The present study source population included all women residing in Lombardy who were NHS beneficiaries during the period 2007–2010. All of these women's deliveries were identified by linking the CEDAP and hospital-discharge databases (ICD-9 codes: 370* to 375*). Those deliveries that were either missing gestational age or had gestational durations < 24 weeks or > 43 weeks were excluded, extending by 1 week the duration of gestation defined by Italian law [30] to account for any imprecise reporting of pregnancy duration. In addition, to exclude deliveries of women with pregestational type 1 diabetes (T1D) or T2D, there was no consideration of deliveries with:

- copayment exemptions for diabetes (code 013.250) granted at any time prior to the estimated start of gestation;
- previous hospital-discharge including a diagnosis of diabetes (ICD-9 code: 249* to 250*);
- three prescriptions for drugs used to treat diabetes (ATC code: A10), with at least one of those for either insulin or sulphonylurea, in the year preceding gestation.

The remaining deliveries constituted the study sample.

2.3. Screening for GDM

In the period covered by the study, screening for GDM was recommended for women at increased risk and consisted of a 50-g glucose challenge, followed by a 100-g oral glucose tolerance test (OGTT) for those with a positive challenge test. Increased risk for GDM included obesity, family history of T2D in first-degree relatives, history of glucose intolerance and macrosomia in previous pregnancies [31].

2.4. Covariates

For each delivery, demographic and clinical information was retrieved from various data sources. GDM screening was