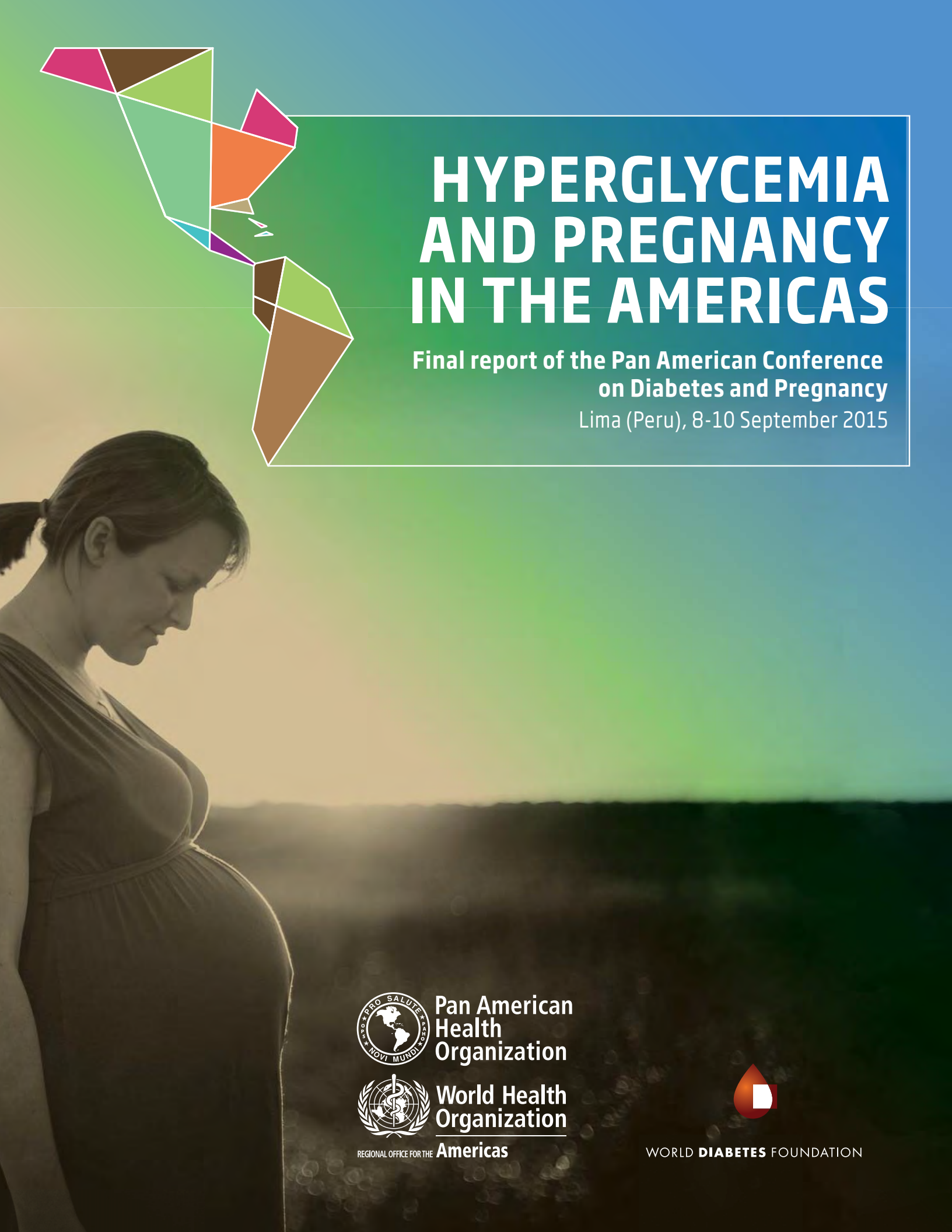

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Final report of the Pan American Conference on Diabetes and Pregnancy

Lima (Peru), 8-10 September 2015

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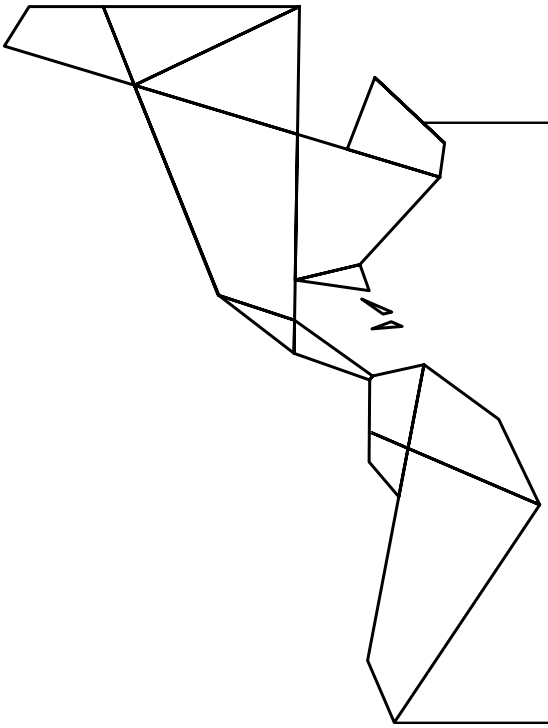

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Pictures included in this report (with exception of those appearing in pages 38, 42 and 44) are from the Pan American Conference on Diabetes & Pregnancy that took place in Lima Peru, 8-10 of September of 2015.
Photos: Luis Eduardo Macchiu
Photos pages 38, 42, 44: 123rf.com
Design: Sandra Serbiano

Contents

Acronyms

A1c:	glycosylated hemoglobin
ADA:	American Diabetes Association
IGT:	impaired glucose tolerance
ALAD:	Latin American Diabetes Association
BMI:	Body mass index
CGDMP-ALAD:	Consensus Group on Diabetes and Pregnancy—Latin American Diabetes Association
CI:	Confidence interval
DM:	Diabetes mellitus
DMP:	Diabetes mellitus in pregnancy
DSME:	Diabetes self-management education
EQ-5D:	EuroQol quality-of-life questionnaire
GDM:	Gestational diabetes
GPC:	Clinical practice guides
GRADE:	Grading of Recommendations Assessment, Development and Evaluation working group
HAPO:	Hyperglycemia and Adverse Pregnancy Outcome study
IADPSG:	International Association of Diabetes and Pregnancy Study Groups
IDF:	International Diabetes Federation
LAC:	Latin America and the Caribbean
LGA:	Large for gestational age
NPH:	Neutral Protamine Hagedorn
OGTT:	oral glucose tolerance test

OHA:	Oral hypoglycemic agent
OR:	odds ratio
PAHO:	Pan American Health Organization
PR:	prevalence ratio
QALY:	Quality-adjusted life years
SAD:	Argentine Diabetes Society
SGA:	Small for gestational age
T2DM:	Type 2 diabetes
USD:	United States dollars
WHO-5:	WHO-Five Well-being Index
WHO:	World Health Organization


SEPT 10 2015
CONFERÊNCIA PAN-AMERICANA SOBRE DIABETES E GRAVIDEZ
Session one:
Screening & Diagnosis of Diabetes in Pregnancy
SEPT
8|10
2015
LIMA
PERU
WORLD DIABETES FOUNDATION
Department of Non Communicable Diseases and Mental Health (NMH)
Pan American Health Organization
World Health Organization

Introduction

Preexisting diabetes and hyperglycemia first detected in pregnancy can have serious consequences for the health both of the baby and the mother; in particular, these conditions increase the risk of miscarriage and perinatal morbidity and mortality. It is estimated that one out of seven pregnant women worldwide suffers from hyperglycemia, corresponding to gestational diabetes (GDM) in 85% of cases.[1] Up to 30% of pregnant women may be affected, but many cases of gestational diabetes are not diagnosed, with potentially fatal consequences for mother and baby. Data on the frequency of GDM is scarce: since there is no global, standardized approach to its screening and diagnosis, GDM often goes undiagnosed.

In 2013, the World Health Organization (WHO) published Diagnostic Criteria and Classification of Hyperglycaemia First Detected in Pregnancy.[2] These guidelines, issued in 2013, are for health professionals who provide care to pregnant women, especially primary care physicians, obstetricians, and gynecologists.

This document is the final report of the Pan American Conference on Diabetes and Pregnancy, held 8-10 September 2015 in Lima (Peru).The objective of the conference was to provide scientific information and disseminate evidence-based guidelines to improve the prevention and control of pregnancy-related diabetes in the Americas.

One hundred people from 31 countries attended the conference. The majority of the participants were health officials from PAHO Member States, but academics and representatives of regional and subregional diabetes associations also attended.

Diabetes and pregnancy in the Americas: Situation analysis

Key points:

- **The data show that highly diverse screening strategies are used in the Americas, including different doses of glucose and different blood glucose cut-offs for GDM diagnosis, which makes it almost impossible to establish comparisons between countries**
- **Variations in the prevalence of GDM (from 0.8% in Belize to 6.5% in Canada) could be related to screening standards and strategies, as well as possible true differences in the actual frequency of GDM**
- **There is a scarcity of statistical data for epidemiological surveillance of GDM**
- **Almost half of the reporting countries did not have policies for GDM screening.**
- **Although there are numerous education programs on type 2 diabetes in the Region, there are few GDM education and prevention programs.**

ADAPTING AND IMPLEMENTING GUIDELINES FOR GDM

Strengthening national programs and policies is an essential strategy to improve universal access to quality health care for the entire population. PAHO/WHO emphasizes the importance of systematically revising the evidence and evaluating the pros and cons of different health care options. Evidence-based clinical practice guidelines facilitate coherent and effective services and, ultimately, better health outcomes for the population.

There are several criteria for formulating clinical practice guidelines that are scientifically valid and of sufficient quality. In order to minimize difficulties in maintaining financial and human resources, most civil services in most Latin American and Caribbean countries have chosen to adopt or adapt guidelines instead of preparing them from scratch. Unfortunately, there are significant obstacles involved in adapting guidelines produced by other institutions and it is hard to find guidelines developed with the GRADE approach.

From 1 July to 30 September 2015 a survey was conducted in all PAHO Member States in order to compile information on different aspects of diabetes in pregnancy. The survey had 80 questions on various topics, such as data on newborns, guidelines, and methods for screening, education, and prevention programs on GDM or diabetes in pregnancy, information on adverse pregnancy outcomes due to GDM, and data on puerperium (Annex 1). The survey was sent by email to the ministries of health of all PAHO Member States. Participating countries could respond on paper or in digital format, or use the online form at SurveyMonkey.

In all, 37 PAHO Member States were contacted. Information was received from 27 countries.

Table 1 shows the criteria currently used to diagnose gestational diabetes in 27 countries of the Americas. It was noted that the definition of GDM varied throughout the Americas and that seven countries (Canada, Colombia, Guatemala, Guyana, Nicaragua, Peru, and the United States—26 % of the countries that responded) use the criteria recommended by WHO for the diagnosis of GDM. Eighteen countries (63%) use a two-step screening strategy for diagnosis, with various cut-off values and different doses of glucose. Five countries (19%) use a three step screening strategy, while Cuba, Guyana, and Mexico use single-step screening. Other differences among countries include the dose of glucose administered in the tolerance tests, which ranges from 50 to 100 g. Panama uses 50 g of glucose, while others use a 75-g or 100-g dose in total.

Sixteen of these 27 countries (59%) reported that they had policies for the systematic screening of diabetes in pregnancy (Table 2). The majority of the country guidelines indicate that screening should be done in the first prenatal visit and between weeks 24 and 28 of pregnancy. Only two countries (Canada, and Suriname) reported having national programs for the prevention of GDM. Seven countries (Belize, Cuba, the Dominican Republic, Mexico, Panama, Paraguay, and Venezuela) have

Table 1. Criteria for the diagnosis of gestational diabetes in selected countries of the Americas, 2006-2015.

Country	Year	Diagnostic steps	Dose of glucose	FG (mg/dl)	OGTT mg/dl		
					1h	2h	3h
North America							
Canada	2013	1 - 2	75	95/92	191/180	162/153	
U.S.	2013/2015	1 - 2	75/100	92/95/105	180/190	153/155/165	-/140/145
Mexico							
Mexico	2009	1	75	95	180	155	
Spanish-speaking Caribbean							
Cuba	2013	1	75	100		140	
Dominican R.	2008	2	75	126		140	
Puerto Rico	2015	2	100	95	180	155	140
English-speaking Caribbean							
Antigua & Barbuda	2006	3	95	100	180	155	140
Barbados	2006	3	100	95	180	155	140
Belize	2011	3	100	105	180	155	140
Dominica	2011	3	75	120	180	155	140
Guyana	2013	1	75	92	180	155	
Jamaica	2008	2	100	95	180	155	140
Suriname	2012	2	75	110		140	
Central America							
Costa Rica	2007	2	100	95	180	155	140
El Salvador	2014	2	100	95	180	155	140
Guatemala	2015	2	75	92	180	153	
Honduras	2011		100	126	180	155	140
Nicaragua	2011	2	75	92	180	153	
Panama	2009	2	75		180	155	140
Andean Region							
Chile	2014	3	75	100/125		140	
Colombia	2015	2	75	92	-	153	
Peru	2011	2	75	92	180	153	
Venezuela	2014	2	75	100		140	
Southern Cone							
Argentina	2013	2	75	100		140	
Brazil	2012	2	75	110		140	
Paraguay	2008	2	75	105		140	
Uruguay	2010	2	75	100		140	

Table 2. Scope of education or prevention programs (type 2 diabetes or gestational diabetes) in selected countries of the Americas

Country/Subregion	Screening policy*	Program		Education program	
		DM	GDM	T2DM	GDM
North/Meso America					
Canada		National	National	National	National
Mexico				Regional	Institutional
U.S.	2	National		National	
Spanish-speaking Caribbean					
Cuba	3	National	Institutional	National	Institutional
Dominican R.	3	National	Institutional	National	Institutional
Puerto Rico	3	National		National	
English-speaking Caribbean					
Antigua & Barbuda	3	National		National	
Barbados	3	National		National	
Belize	3	Institutional		National	Institutional
Dominica	3	National		National	
Guyana	4				
Jamaica	3	National		National	
Saint. Kitts					
Saint Lucia		National		National	
Suriname		National	National		
Trinidad and Tobago					
Central America					
Costa Rica					
El Salvador	2	National		National	
Guatemala					
Honduras	1				
Nicaragua					
Panama	3			Institutional	Institutional
Andean region					
Chile	3	National			
Colombia					
Peru		National	Regional	National	
Venezuela	3	National		Institutional	Institutional
Southern Cone					
Argentina	3	National			
Paraguay		National	Institutional	National	Institutional

* Screening policy: 1 = 1st prenatal visit; 2 = week 24-28 of pregnancy; 3 = 1st prenatal visit + week 24-28 of pregnancy; 4 = not specified.

institutional educational programs on GDM. Only Canada has an educational program on GDM at the national level.

Table 3 presents the number of live births and newborns that are large for gestational age (LGA) and small for gestational age (SGA) in 17 countries (63% of those that sent information).

Data were provided for 2013 or 2014, with the exception of Canada (2010). Among countries sending national data, a total of 3,739,603 live births were reported. The combined overall prevalence of LGA and SGA was 16.5% and 6.3%, respectively. The highest proportion of LGA was reported by Mexico (21.9%). SGA was the most frequent in Chile (10.2% of live births). Puerto Rico reported the lowest proportion of SGA (2.5%). In the countries that presented institutional data, the combined proportion of LGA and SGA was somewhat lower, with institutions in Peru reporting the highest proportion of LGA and in

Table 3. Number of live births and newborns large for gestational age and small for gestational age, in selected countries of the Americas, 2010-2014

Country	Year	Live births	LGA (%)	SGA (%)
Institutional data				
Antigua & Barbuda	2014	1,100	8.1	19.7
Barbados	2014	2,707	4.8	
El Salvador	2014	83,530	1.4	6.0
Guatemala	2014	387,342	-	11.9
Guyana	2013	5,785	3.0	12.7
Panama	2014	14,275	2.2	2.5
Peru	2014	629	8.7	2.5
Venezuela	2014	212	7.5	4.7
Subtotal		495,580	1.8	10.6
National data				
Argentina	2014	754,603	7.6	7.4
Belize	2014	7,244	18.9	4.4
Canada	2010	237,718	10.1	8.0
Cuba	2014	122,643	15.0	3.0
Chile	2013	242,005	10.2	10.2
Dominica	2014	867		7.6
Dominican Republic	2014	131,251	4.4	8.9
Mexico	2012	2,206,692	21.9	5.4
Puerto Rico	2013	36,580	7.0	2.5
Total	-	**3,739,603**	**16.5**	**6.3**

El Salvador reporting the lowest (8.7% and 1.4%, respectively). The highest proportion of SGA was reported in institutions of Antigua (19.7%) and the lowest reported by institutions from Panama, and Peru (2.5%).

Figures 1 and 2 show the prevalence (%) of hyperglycemia in pregnancy (GDM, DM) in selected countries of the Americas, according to national data (Figure 1) or institutional data (Figure 2). Only 14 countries reported in this regard, and 50% was institutional data. Among the countries that presented national data, diagnosed GDM ranged from 0.8% in Belize to 6.5% in Canada, while the prevalence of diabetes in pregnancy ranged from 5.3% in Chile to 0.3% in Dominica. In overweight or obese women, El Salvador reported an incidence of GDM of 0.2% (data not shown in tables or figures).

In the countries that presented institutional data (Figure 2), the percentage of diagnosed GDM ranged from 0.01% in Panama to 7.8% in Mexico, while the prevalence of diabetes in pregnancy ranged from 3% in Mexico to 0.2% in Panama.

Table 4 shows the treatment provided to women with GDM during pregnancy in nine countries of the Americas. Cuba reported treating 80% of GDM cases with diet and physical activity, followed by Chile (51.3%); a considerably lower proportion was reported by the other countries and institutions that presented information. Saint Kitts and Dominica reported treating all cases of GDM with insulin. Other countries with institutional data, including El Salvador, Guatemala, and Guyana, also reported administering only insulin to most cases of GDM. Cuba reported using insulin in 20% of GDM cases.

Table 5 shows national data on mothers and newborns reported by the countries, as well as statistics on population and diabetes. The size of the population in the countries that reported

Figure 1. Prevalence (%) of hyperglycemia in pregnancy (GDM [blue], DM [red]) in selected countries of the Americas, 2012-2014 (national data)

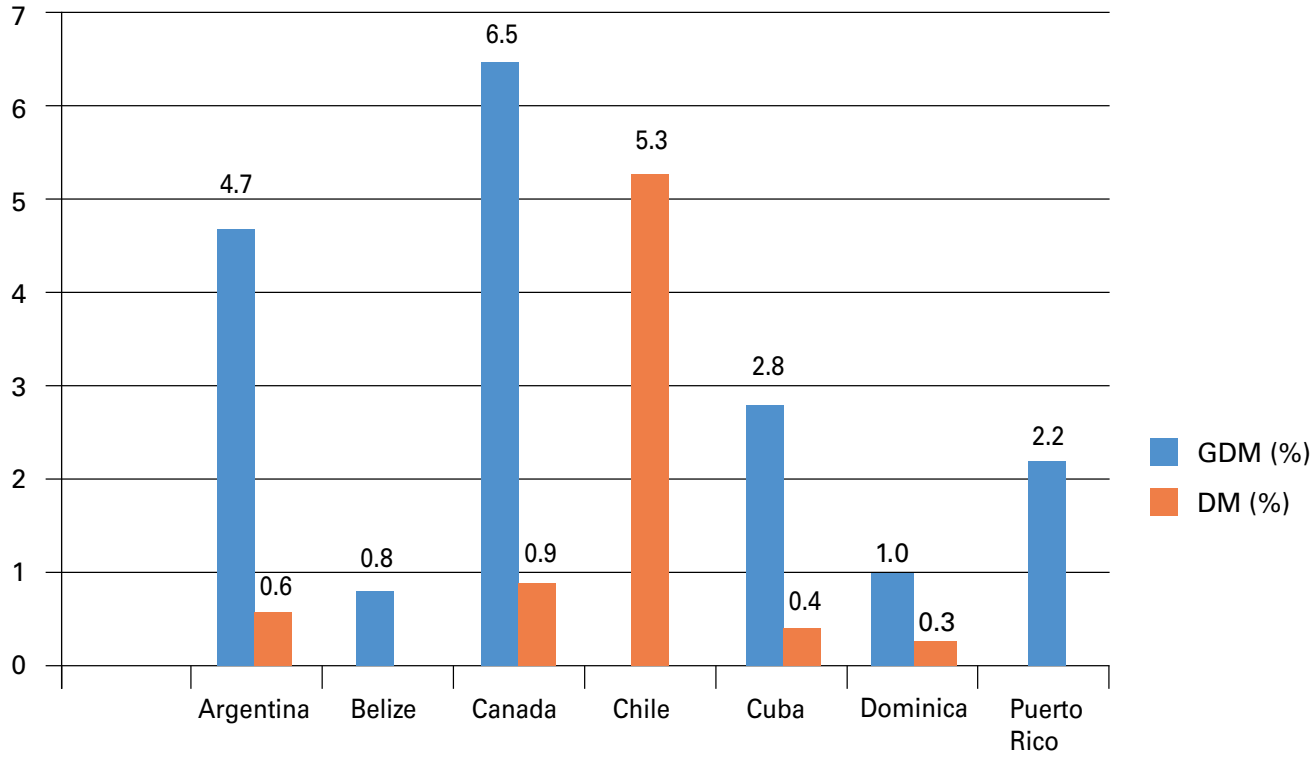


Figure 2. Prevalence (%) of hyperglycemia in pregnancy (GDM [blue], DM [red]) in selected countries of Americas 2012-2014 (institutional data)

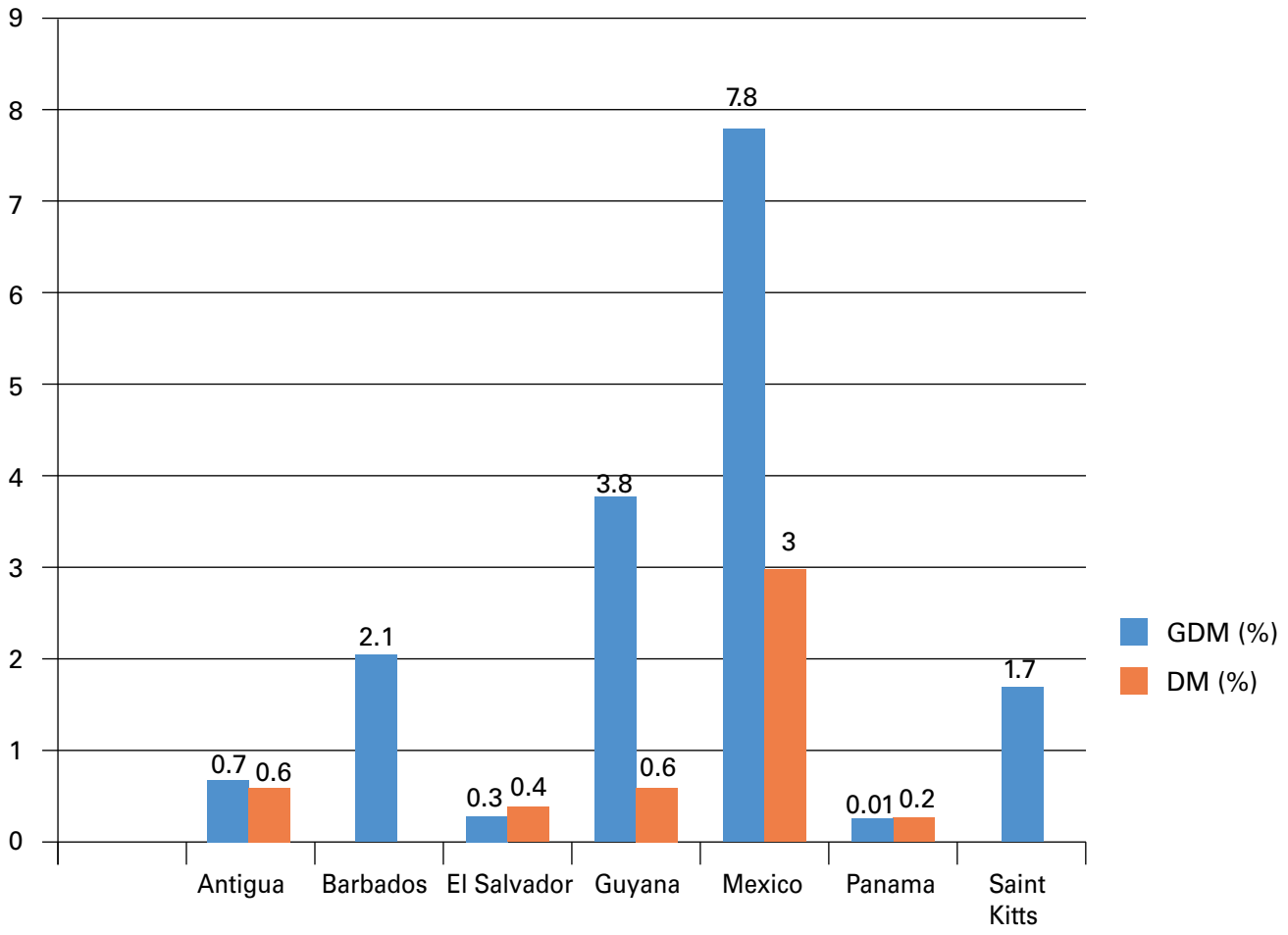


Table 4. Treatment of GDM/diabetes in pregnant women in selected countries of the Americas

Country	Diet and exercise (%)	OHA (%)	Only insulin (%)	Insulin+OHA (%)
Institutional data				
Dominica	0.0	0.0	100.0	0.0
El Salvador	1.2	3.4	13.2	32.8
Guatemala	9.8	25.0	65.0	0.0
Guyana	0.0	25.0	74.0	2.0
Mexico	65.0	35.0	5.0	3.0
Saint Kitts	0.0	0.0	100.0	0.0
National data				
Chile	51.3	0.0	0.0	0.0
Cuba	80.0	0.0	20.0	0.0

Table 5: Statistics on mothers and newborns in selected countries of the Americas (National Data), 2010-2014

	Argentina	Belize	Canada	Chile	Cuba	Dominica	Mexico	P. Rico	United States of America
Total population (thousands)	42,155	348	35,871	17,924	11,249	74	125,236	3,680	325,128
Total prevalence (%) of DM	9.80	12.90	6.80	9.40	10.00	17.70	9.20	15.70	12.30
Prevalence (%) of DM in women	10.40	17.60	6.40	10.40	12.90	12.30		16.80	11.40
Mortality (x100,000) from DM in women	12.00	96.00	9.00	15.00	14.00	35.00	78.00	42.00	11.6
Live births	754,603	7,244	237,718	242,005	122,643	867	2,206,692	36,580	3,932
Perinatal deaths (%)	0.53	1.73	0.60	0.95	4.80	2.19		1.11	0.00...
Caesarean section (%)	31.90	35.36	28.24	26.28	60.00	3.11	45.58	47.56	33.06
Birth defects (%)	0.70	1.32	3.96	1.95	4.30	0.81		1.18	2.99
Eclampsia (%)	0.20	0.19	0.06	0.04			0.01	0.19	20.98
Preeclampsia (%)	1.50	1.16		0.05	5.00	0.46	0.13	3.52	11.37
Premature deliveries (%)	8.50	8.35	7.70	2.39	12.00	5.31	6.45	14.55	
Postpartum hemorrhage (%)	0.30	1.01	0.46	0.16		0.69			

Note: The data on prevalence of diabetes for Argentina, Canada, Mexico and Puerto Rico are self-reported. The data on prevalence of diabetes for Barbados, Chile, and Cuba are based on fasting blood glucose or self-reported diabetes. The data on prevalence of diabetes for Belize are based on fasting blood glucose and on OGTT, or self-reported.

Data sources: Population and mortality data[3]; Prevalence data sources: Argentina[4], Dominica[5], Belize[6], Canada[7], Chile[8], Cuba[9], Mexico[10], Puerto Rico[11], United States[12]; maternal and newborn data are from the national health authorities (data from Canada are for 2010-2012; data for other countries are for 2012-2014)

varied from 325 million in United States to 74,000 inhabitants in Dominica. The highest estimated prevalence of diabetes corresponded to Dominica (17.7%) and the lowest in Mexico (9.2%). Among the countries that reported diagnosed or auto-reported diabetes, the highest prevalence was found in Puerto Rico (15.7%) and the lowest in Canada (6.8%). The highest mortality from diabetes among women occurred in Belize (96×100.000 inhabitants). The greatest percentage of perinatal deaths was observed in Cuba (4.8%) and the smallest in Argentina (0.53%). Cuba registered the highest proportion of caesarean sections (60%). Eclampsia and preeclampsia were reported with the highest frequencies in the United States (20.98% and 11.37% respectively). The highest and lowest proportion of premature deliveries was reported in Puerto Rico (14.55%) and Chile (2.39%) respectively.

Diabetes Mellitus (DM) and its burden in Latin America & the Caribbean

Prevalence of diabetes in the Americas

Key points:

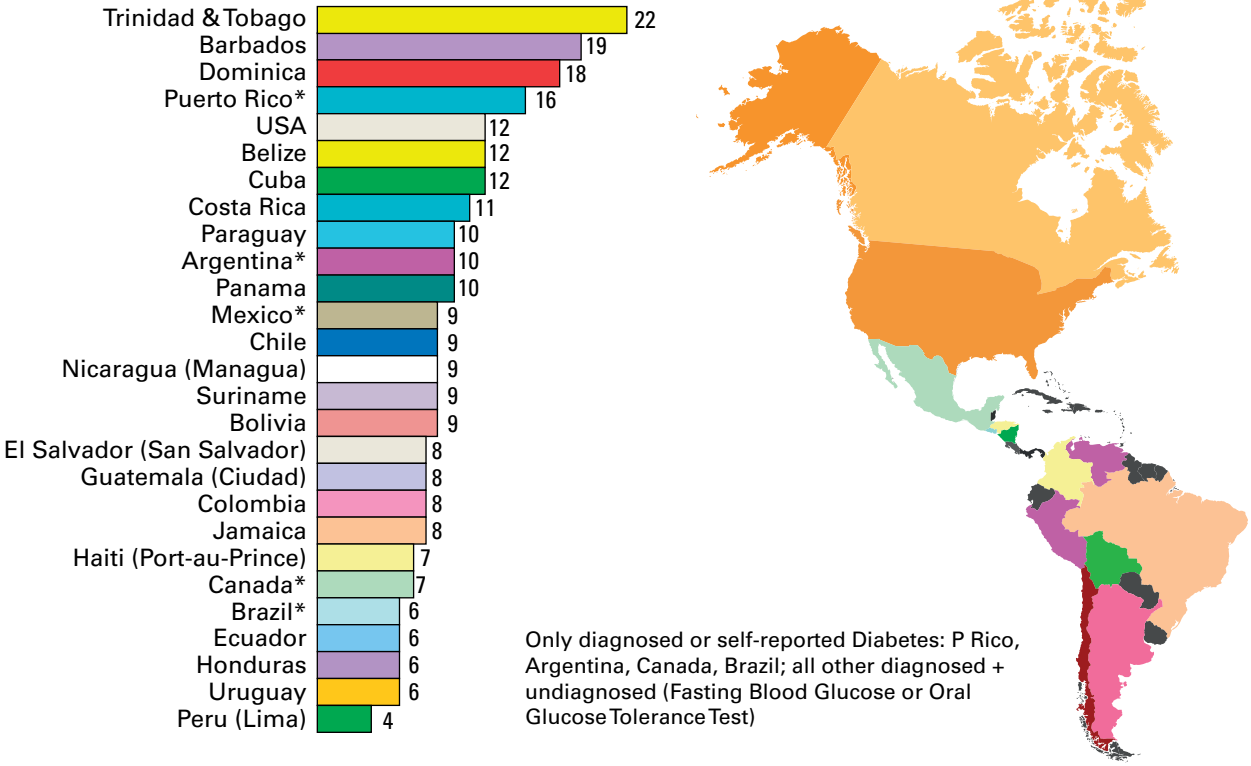
- **In the Americas, an estimated 73.9 million people had diabetes in 2015 and half of all adults are overweight or obese, an important risk factor for type 2 diabetes**
- **It is estimated that half of the people with type 2 diabetes in the world have not been diagnosed**
- **Undiagnosed diabetes can lead to early appearance of complications**
- **In the Americas the prevalence of diabetes varies widely between 22% in Trinidad & Tobago and 4% in Lima, Peru**
- **The estimated global prevalence of hyperglycemia in pregnancy was 16.2% of all pregnancies in 2015**
- **An estimated 1.8 million cases of pregnancies are affected by gestational diabetes every year in the Americas**

An estimated 73.9 million people in the Americas had diabetes in 2015. Furthermore, it is estimated that half of all adults are overweight or obese, an important risk factor for type 2 diabetes, together with physical inactivity. Diabetes is associated with more than half a million deaths each year in the Region. Around the world, it is estimated that half of the people with type 2 diabetes have not been diagnosed and that by the time a diagnosis is made, the disease has already caused severe health complications[1].

The highest prevalence of diabetes has been reported in the English-speaking Caribbean (22% in Trinidad and 19% in Dominica). A high prevalence of diabetes has also been reported in Puerto Rico (16%), the United States, Belize and Cuba (12% respectively). The lowest reported prevalence was in Lima, Peru (4%)[6].

Of the 415 million people estimated to have diabetes around the world in 2015, 199.5 million were female. According to the Diabetes Atlas, the global prevalence of hyperglycemia in pregnancy was 16.2% of all pregnancies. At the world level, one out of seven pregnancies may

Prevalence (%) of diabetes among adults, as per results of population based surveys, 2016



Source: USA: NHANES, Menke 2015;Barbados: Howitt 2015; US: P Rico: PR-BRFSS2014; National Diabetes Statistics Report, 2014; Bolivia: Pan Am J Public Health 10(5), 2001; Honduras, Guatemala, Nicaragua, Belize, El Salvador: Barceló Diabetes Care 2012, Haiti (Diabetic Medicine); Panama: McDonald 2013; Canada, Diabetes in Canada, 2011; Mexico ENSANUT 2012. Jamaica (Jamaica Health and Lifestyle Survey, 2008); C Rica, STEPS CR 2011; Argentina 3ra. EFR 2013; Brazil, VIGITEL 2011;Trinidad & Tobago STEPS 2011; Quito/Lima: CARMELA 2009; Uruguay STEPS 2013; Dominica STEPS 2008

be affected by hyperglycemia, 85.1% of these corresponding to GDM. In 2014, an estimated 20.9 million newborns were exposed to maternal hyperglycemia in pregnancy and there were an estimated 17.8 million GDM diagnoses[1,15].

It is calculated that GDM affects 16% of all pregnancies and that the Central America-South America and North America-Caribbean subregions each have about 900,000 cases annually, affecting about 12% of all pregnancies[15]. Another calculation indicates that 87.6% of hyperglycemia in pregnancy occurs in low- and middle-income countries, which often have limited access to maternal care. Obesity and diabetes affect women disproportionately: Gestational diabetes in particular is detrimental to mothers and babies, increasing the frequency of perinatal morbidity and mortality. Furthermore, there is an established relationship linking maternal obesity and diabetes with an increased predisposition to the development of childhood diabetes, producing a vicious cycle in which obesity and diabetes result in more diabetes.

The cost of diabetes in Latin America and the Caribbean

Key points:

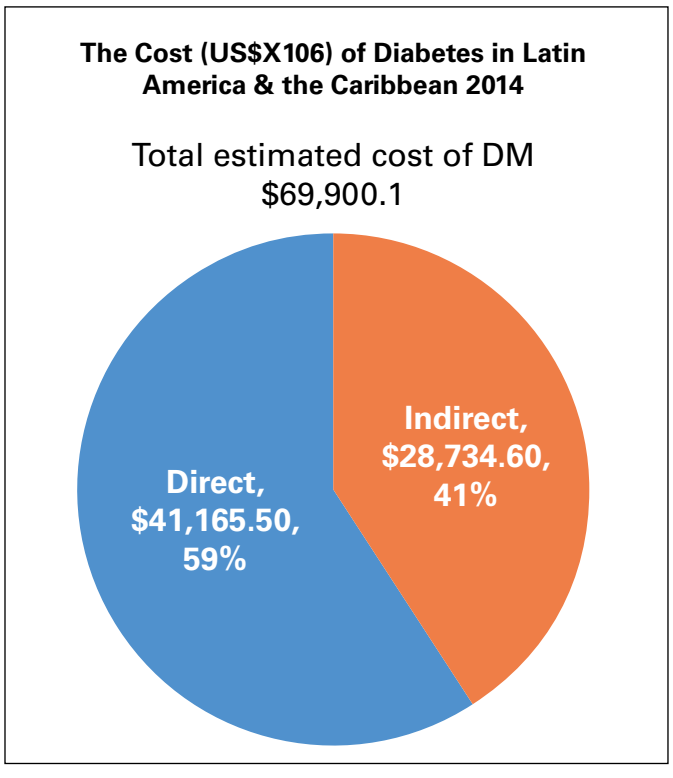
- **The estimated cost of diabetes in 2014, in Latin America and the Caribbean, was more than US$69.9 billion, with $28.7 in direct costs and $41.1 billion in indirect costs**
- **In Latin America and the Caribbean, the estimated average commercial price of a vial of insulin was $35, while the commercial price of 100 tablets of metformin was $17 on average**
- **Through the PAHO Strategic Fund, the current price of a vial of insulin is $4.20, while 100 tablets of metformin cost $0.89**
- **If insulin and metformin prices are adjusted to the PAHO Strategic Fund prices, the estimated cost of diabetes in 2014 would have been reduced by 29% and the annual per capita cost decreased from $1,223 to $803**

In 2014, PAHO studied the cost of diabetes in Latin America and the Caribbean, based on the calculation that over 34 million people throughout the Region had diabetes that year [16].

The overall cost of diabetes was calculated at more than US$69.9 billion, with $28.7 in direct costs and $41.1 billion in indirect costs.
The indirect costs of diabetes totaled $28.7 billion, of which $16.9 billion corresponded to premature deaths, $8.8 billion to permanent disability, and $2.9 billion to temporary disability. Total direct costs came to $41.1 billion, the main cost being the treatment of complications ($15.0 million), followed by consultations and drugs (over $9.0 billion each), hospital care ($7.8 billion), emergency visits ($4.2 billion), and tests ($1.1 billion).

PAHO compiled information on the commercial cost of medication and services necessary for treating diabetes. The average price of a vial of insulin was $35, while 100 tablets of metformin cost $17 on average. Through the PAHO Strategic Fund, the current price of a vial of insulin is $4.20, while 100 tablets of metformin cost $0.89 [17].
The average annual cost of treating a case of diabetes in Latin America and the Caribbean was estimated at $1,223. The highest per capita cost of diabetes corresponded to Puerto Rico ($3,044) and the lowest to Peru ($500).

If insulin and metformin prices are adjusted to PAHO Strategic Fund prices, the cost of diabetes can be reduced by 29%; this includes a 78% reduction in the cost of medication and a 34% drop in the per capita cost (from $1,223 to $803).



Diabetes screening and diagnosis in pregnancy

Key points:

- **Gestational diabetes is one of the most frequent medical complications of pregnancy around the world, affecting 1% to 35% of pregnant women**
- **Gestational diabetes increases the risk of obstetric problems such as preeclampsia, caesarean section and premature delivery**
- **Women and babies affected by gestational diabetes have a significant risk of future diabetes and cardiovascular disease**
- **The WHO guidelines, hyperglycemia first detected in pregnancy, establishes that this disease should be classified as diabetes mellitus in pregnancy or gestational diabetes mellitus**
- **The WHO/IADPSG guidelines based on the HAPO study recommends that Gestational diabetes should be diagnosed with a fasting blood glucose 5.1-6.9 mmol/l (92-125 mg/dl), or an OGTT after oral administration of 75g glucose of one hour ≥ 10.0 mmol/l (180 mg/dl) or two hours of 8.5-11.0 mmol/l (153-199 mg/dl)**

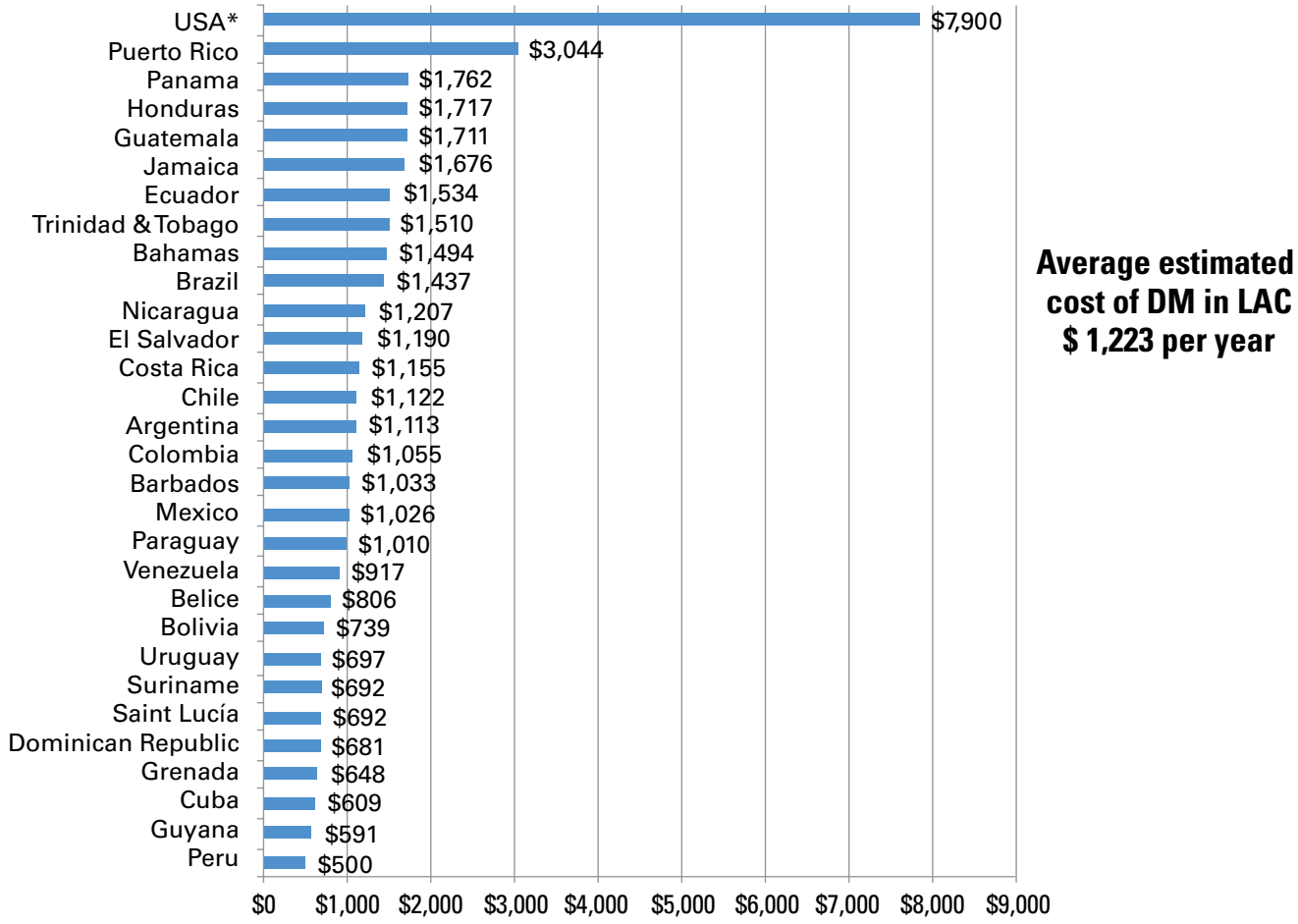
GDM is one of the most frequent medical complications of pregnancy around the world, affecting 1% to 35% of pregnant women, depending on the diagnostic criteria used. In Mexico, for example, the prevalence of GDM is 10-12% of all pregnancies if ADA 2010 criteria are used, but rises to 30.1% according to IADPSG criteria.

GDM was first recognized 60 years ago and its importance has been growing as its frequency has increased. O'Sullivan and Mahan were the first to describe GDM as an indicator of future risk of diabetes in the affected mother[19]. The obstetric risks for the mother became more obvious in the 1980s and 90s, and in the last 30 years it has become clearly understood that there is a high risk of offspring developing insulinopenia or insulin resistance before birth in mothers with GDM [20,21].

It has been demonstrated that gestational diabetes increases the risk of obstetric problems such as preeclampsia, as well as the risk of caesarean section and premature delivery, mainly due to macrosomic babies. With regard to long-term risks, GDM indicates a significant risk of future maternal diabetes and cardiovascular disease. Premature birth can lead to pulmonary problems and jaundice in offspring. The baby's large size can cause injuries during delivery (occasionally shoulder dystocia and even Erb's palsy) and the need for neonatal care due to respiratory problems, hyperbilirubinemia, and low blood glucose. Macrosomic babies are more likely to develop future intolerance to glucose, metabolic syndrome, and in some populations, diabetes [22,23].

The Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study[24] —an international, multicenter cohort study in which pregnant women were given the oral glucose tolerance test (OGTT, with 75 g of glucose and blood glucose measured after two hours) and were monitored throughout their pregnancy—created an expectation of universal convergence toward adopting the 75-g OGTT for the diagnosis of gestational diabetes, and of formulating the criteria for that diagnosis. In 2008, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) sponsored

Estimated annual per capita direct cost (US$) of diabetes by country in LAC, 2014 and the US 2012



*American Diabetes Association. Economic Cost of Diabetes in the US in 2012. Diabetes Care 2013:36:1033-1046

Source: PAHO, unpublished; American Diabetes Association (ADA)[18].

the International Workshop-Conference on Gestational Diabetes Diagnosis and Classification in order to examine the results of HAPO and other studies of the association between maternal blood glucose and perinatal outcomes and long-term effects on offspring. Subsequently, the IADPSG Consensus Panel recommended criteria for the diagnosis of GDM, where thresholds are the average glucose values at which odds for birth weight 90th percentile, cord C-peptide 90th percentile, and percent body fat 90th percentile reached 1.75 times the estimated odds of these outcomes at mean glucose values, based on fully adjusted logistic regression models compared with the average for the population.

The new WHO guidelines seek points of convergence in the diagnostic criteria so that other questions about the potential effects of GDM and treatments provide better results.

The diagnostic criteria for hyperglycemia in pregnancy recommended by WHO in 1999[25] were not evidence-based and should be updated in light of previously unavailable data. Such updating follows WHO procedures for the formulation of guidelines. A systematic review of key questions was carried out and the GRADE methodology (Grading of Recommendations Assessment, Development and Evaluation[26]) was used to evaluate the quality of the evidence

PREPARING A POLICY SYNOPSIS FOR GDM

The presentation focused on the idea of translating knowledge into policy, the concept of evidence-based policies, and the role that evidence plays in health policy decision-making. There was also an explanation of the general idea of an "evidence summary for policy", what this includes, and how it can be used.

"Evidence summaries for policy" are a relatively new way to "present" research results to decision-makers and other stakeholders. The starting point in a health policy issue is to present what is known or what has been produced in that specific area. Once the policy issue is clarified and priorities are set, the focus is on finding all kinds of relevant evidence on the different aspects. The process is "achievable" or "feasible" if the available systematic reviews are used as the starting point. The purpose of an evidence summary for policies is to bring together the worldwide evidence (in systematic reviews) and the available local evidence on the different aspects of a health policy issue.

There was also discussion of the preparation phases and formats. The format for an "evidence summary for policies" tends to include three sections: i) a one-page summary of the key messages in list form; ii) a 3-5-page summary of the problem, the policy options, and considerations for their implementation; and iii) a full report that includes all the information collected for every phase (the problem, options, and considerations for implementation). Key questions were also presented to facilitate the drafting of the document and to confirm that it is complete according to PAHO/WHO methodology. Finally, its usefulness was discussed, as well as the different situations in which it could be used.

and the strength of the recommendations on the cut-off values for the diagnosis of gestational diabetes. In the absence of evidence (diagnosis of diabetes in pregnancy) or if the GRADE methodology was not considered appropriate, the recommendations were based on consensus.

The systematic review of the cohort studies showed that women with hyperglycemia detected during pregnancy had a greater risk of adverse pregnancy outcomes, in particular newborn macrosomia and preeclampsia, even after excluding the most serious cases of hyperglycemia that required treatment. Treatment of GDM is effective in reducing cases macrosomia, LGA, shoulder dystocia, preeclampsia, and hypertension in pregnancy.

The WHO guidelines support the recommendations of the IADPSG Consensus Panel[27] and distinguish between diabetes and lesser degrees of glucose intolerance during pregnancy (gestational diabetes), using the same criteria to diagnose diabetes both in pregnant women and all other persons. Gestational diabetes should be diagnosed at any time in pregnancy if one or more of the following criteria are met:

- fasting blood glucose 5.1-6.9 mmol/l (92-125 mg/dl)
- plasma glucose one hour after oral administration of glucose ≥ 10.0 mmol/l (180 mg/dl)
- plasma glucose two hours after oral administration of 75 g glucose: 8.5-11.0 mmol/l (153-199 mg/dl)

The criteria for GDM diagnosis are based on the risk of adverse pregnancy outcomes. However, given the continuous risk of adverse outcomes with increasing blood glucose, any diagnostic threshold is somewhat arbitrary. The IADPSG Consensus Panel decided to define the diagnostic values on the basis of a 1.75 odds ratio for adverse neonatal outcomes (birth weight 90th percentile, cord C-peptide 90th percentile, and percent body fat 90th percentile) compared with mean values for fasting blood glucose, and plasma glucose one hour and two hours after administering glucose in the OGTT [2,27].

The WHO expert group reached the conclusion that any cut-off value would be arbitrary and that the value should be based on each country's capacity. The most recent diagnostic recommendations suggest the fasting blood glucose test or the 75-g OGTT. These recommendations are in line with the guidelines for GDM issued by WHO, IADPSG, ADA, and Canada [2,21,27,28].

According to the WHO guidelines, hyperglycemia first detected in pregnancy should be classified as diabetes mellitus in pregnancy (DMP: WHO

Test	Dose of glucose	GDM (gestational diabetes mellitus) (Recommendation 3)		DM in pregnancy (DMP) (Recommendation 2)	
		mmol/l	mg/dl	mmol/l	mg/dl
Fasting blood glucose	-	5.1-6.9	92-125	≥ 7,0	126
Plasma glucose after one hour	75 g	≥ 10.0	180	-	
Plasma glucose after two hours of having taken a 75-g glucose solution	75 g	8.5-11.0	153-199	≥ 11,1	200
Random glucose	-	-	-	≥ 11.1	200

recommendation 2) or gestational diabetes mellitus (GDM: WHO recommendation 3) [2].

Finally, a prospective test carried out by Meltzer *et al.*, comparing the results of the one- and two-step diagnostic tests, observed that the diagnostic rates for the 75-g test in its study (following IADPSG criteria) were very similar to the values observed by Carpenter-Coustan using a 100-g OGTT [29].

A diagnosis of gestational diabetes indicates an increased risk of the mother developing diabetes (risk ratio = 7.4); and some type of glucose intolerance can be seen in approximately half of women within 20 years after diagnosis. There is also a demonstrated, related risk of cardiovascular disease. Offspring have a greater risk of future obesity and glucose intolerance, and this increases if the mother does not or cannot breast-feed, if she herself develops diabetes, or if her husband is obese. A recently published article indicates that the husband of a woman with GDM has a 33% greater risk of having or developing diabetes[29]. Detecting women at risk of diabetes is truly important for both for families and in terms of public health and social costs.

Apparently, not all societies are in favor of following the criteria proposed by WHO. The diabetes and pregnancy committee of the Argentine Diabetes Society (SAD) is conducting a multicentric study to compare the current diagnostic guidelines proposed by ALAD in 2008 [30] with the IADPSG guidelines. The study is in progress. A cut-off value was established for GDM diagnosis and 927 pregnant women were evaluated after diagnosis and treatment following the ALAD 2008 criteria. The prevalence of gestational diabetes was 10.36% according to the ALAD criteria versus 26.7% using the IADPSG criteria, with a similar positive predictive value for macrosomia. For the time being, SAD continues to follow the ALAD guidelines, as it considers the proposed IADPSG criteria not to be cost-effective. Consequently, it recommends not adopting the new WHO criteria for the diagnosis of GDM and proposes continuing with the algorithm for the detection and diagnosis of diabetes in pregnancy established by the ALAD Consensus Group on Diabetes and Pregnancy in 2007 [31]. These criteria define GDM as fasting blood glucose ≥ 100 mg/dl or ≥ 140 mg/dl two hours after administering the 75-g OGTT.

Cost-effectiveness of GDM screening

Key points:

- **It is important to include the long-term results and adapt to local preferences when evaluating the cost-effectiveness of GDM screening**
- **Cost-effectiveness should be evaluated when comparing the recently proposed IADPSG criteria with previous criteria**
- **It appears to be cost-effective to use the IADPSG/WHO screening criteria, especially considering the long-term health benefits**

Following is a summary of six relevant studies that have evaluated the cost-effectiveness or usefulness of GDM screening strategies, comparing IADPSG/WHO criteria with previously followed guidelines.

Werner *et al.*[32] compared the cost-effectiveness of the IADPSG/WHO criteria with previous criteria using a 50-g glucose test 24-28 weeks after the 3-hr 100-g OGTT, using the Carpenter-Coustan diagnostic criteria and a no-screening strategy. Their results indicated that—when the long-term benefits for maternal health are taken into account—both screening strategies were cost-effective (incremental costs per quality-adjusted life year (QALY) came to savings of $US 17,000 for Carpenter-Coustan and $20,000 for IADPSG).

Mission et al. prepared an analytical decision-making model comparing systematic screening methods: 2-hr OGTT versus 1-hr OGTT [33]. They established a quantified cost-effectiveness threshold of $100,000/QALY and demonstrated that screening with the 2-hr OGTT was more expensive, more effective, and cost-effective at $61,503/QALY. They also reported that the IADPSG diagnostic method remained cost-effective, as long as another >2.0% of patients were diagnosed and treated for GDM.

Another study that implemented a decision analysis tool to evaluate cost-effectiveness, using both local data and published calculations, reported that some $1,600 in QALY costs were avoided in India and $1,800 in Israel, meaning that the screening strategies were highly cost-effective[34].

The St. Carlos Gestational Diabetes Study[35] evaluated the cost-effectiveness of one-step IADPSG for GDM screening and diagnosis compared with the traditional two-step Carpenter-Coustan criteria. They reported that adverse maternal and neonatal outcomes were significantly lower with the IADPSG strategy than with the Carpenter-Coustan criteria and the estimated difference in total cost was approximately $19,000 per 100 women.

Finally, a recent systematic review has demonstrated that incorporating the long-term benefits of detecting and treating GDM has an enormous impact on cost-effectiveness calculations[36]. The authors reached the conclusion that, in view of highly heterogeneous methodology and the different results observed in the existing data set, it is unreasonable to make any global recommendation. They also suggested including the long-term results, adapting to local preferences when evaluating the cost-effectiveness of GDM screening, and examining the impact of the recently proposed IADPSG criteria.

DEVELOPING EDUCATIONAL CAPACITY FOR GDM

GDM is one of the most frequent medical complications of pregnancy, affecting between 10% and 35% of pregnant women worldwide, depending on the diagnostic criteria used. In Mexico, for example, the prevalence of GDM is 10-12% of all pregnancies if ADA 2010 criteria are used, but rises to 30.1% according to IADPSG criteria. The first step to identify women with GDM is to set up a GDM detection and diagnosis program. Once identified, women with GDM should be treated with proper diet, physical exercise, self-monitoring of glucose and, if necessary, insulin.

Diabetes self-management education (DSME) is aimed at providing the knowledge, skills, and necessary capacity for self-management of pre-diabetes and diabetes. This process includes the needs, goals, and life experiences of the person with diabetes or pre-diabetes and follows evidence-based standards. The general objectives of DSME are to provide support for decision-making, self-management, problem-solving, and active collaboration with the health care team with a view to improving clinical outcomes, general health, and quality of life. During the treatment and supervision of women with GDM, those who receive education on diabetes have shown better adherence to treatment, greater glycemic control, and better quality of life. As a part of the education process, women with GDM should receive information on how proper control of blood glucose during pregnancy can reduce the risk of fetal macrosomia, injury during childbirth, caesarean section, and pre-eclampsia. With education, women are more likely to understand the importance of diet and the role of normal weight gain in pregnancy and the perinatal period. They will be more aware of the possibility of short-term newborn morbidity during the neonatal period, and the possible risk of adult obesity or diabetes. They will also be aware that women with a history of GDM are at greater risk of type 2 diabetes (2, 5, and 10 years) after delivery. As a result, treatment for women with GDM should ideally include an education program, according to the health care model and resources of each country.

Treatment of diabetes in pregnancy

Key points:

- **Treatment of diabetes in pregnancy or GDM prevents perinatal and maternal morbidity and mortality**
- **GDM can be treated at the first level of care if health teams are adequately trained**
- **The frequency of contact between patients with GDM and health services depends on needs, patient education, and health system capacities**

The evidence uniformly shows that untreated GDM is associated with greater maternal risks during pregnancy and for the newborn. Proper treatment of diabetes and hyperglycemia in pregnancy is essential to prevent maternal and perinatal morbidity and mortality [37,38].

There is a general consensus that having an interdisciplinary team is ideal in order to achieve the best possible outcomes in high-risk pregnancies, in particular for women with type 1 and type 2 diabetes and GDM. In some countries, these patients receive care in third-level hospitals with specialized intensive care units for mothers and newborns; but first- and second-level services could provide care to pregnant women with diabetes if their health teams are adequately trained.

The frequency of medical visits varies with resources and national regulations on pregnancy and childbirth.

Education and gestational diabetes

Key points:

- **Education for self-management is fundamental for diabetes management**
- **Educational programs for GDM should include information on diet, physical activity, and present and future risks for mothers and babies**

The first step to identify women with GDM is to set up a GDM detection and diagnosis program. Once identified, women with GDM should be treated with proper diet, physical exercise, self-monitoring of glucose and, if necessary, insulin or oral hypoglycemics. Diabetes self-management education (DSME) is the process of providing the knowledge, skills, and necessary capacity for self-management of pre-diabetes and diabetes. This process includes the needs, goals, and life experiences of the person with diabetes or pre-diabetes and follows evidence-based standards. Self-management involves a set of tasks that a person carries out to live well with one or more chronic disorders. These tasks include gaining confidence to deal with medical management, role management, and emotional management [39].

The educational process is based on individual needs, establishing personal objectives that take into account previous experiences with diabetes or pre-diabetes. Ideally, the process should follow evidence-based standards [40]. The general objectives of DSME are to provide support for decision-making, self-management, problem-solving, and active collaboration with the health care team with a view to improving clinical outcomes, general health, and quality of life.

During the treatment and supervision of women with GDM, those who receive education on diabetes have shown better adherence to treatment, greater glycemic control, and better quality of life [41–43].

As a part of the education process, women with GDM should receive information on how proper control of blood glucose during pregnancy can reduce the risk of fetal macrosomia, injury during childbirth, caesarean section, and pre-eclampsia. Materials should also be included to show the importance of nutrition and the optimal goals for weight gain during pregnancy and postpartum. Another important subject is the possibility of short-term newborn morbidity during the neonatal period. Women with GDM and their babies have a greater long-term likelihood of becoming obese or developing type 2 diabetes in the future. Ideally,

case management of women with GDM should include an educational program that is compatible with the model of care and resources available in each country. There are several examples of educational materials for patients, such as those of the U.S. National Institutes of Health [44].

CONSENSUS GROUP ON DIABETES AND PREGNANCY-LATIN AMERICAN DIABETES ASSOCIATION (CGDMP-ALAD)

Representatives of 13 countries participated in the Consensus Group on Diabetes and Pregnancy—Latin American Diabetes Association (CGDMP-ALAD), which met in Santa Cruz de la Sierra (Bolivia) in September 2015. The Group reviewed and accepted the current WHO definition of diabetes as fasting blood glucose ≥ 126 mg/dl or 2-hr 75-g OGTT ≥ 200 mg/dl. Pre-gestational diabetes was defined as type 1 or type 2 diabetes diagnosed according to the current WHO criteria or diagnosed prior to pregnancy. The Consensus Group decided to adopt the definition of gestational diabetes as fasting blood glucose 100-125 mg/dl on two different days or 2-hr 75-g OGTT ≥ 140 md/dl. The Group considered that obese or overweight pregnant women with fasting blood glucose 85-99 mg/dl should be considered at high risk for GDM and should be offered a nutrition and physical activity plan. These programs are aimed at preventing the future development of GDM or DM. CGDMP-ALAD considered the fact that the IASDPG recommendations were based on the HAPO study, in which no Latin American ethnic group was represented, and that the low threshold (92 mg/dl) would increase the number of women receiving treatment, unnecessarily adding to the burden in the countries.

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Diet

Key points:

- **Most GDM cases can be treated by simply making changes in lifestyle (proper diet and physical activity)**
- **Adjust daily caloric intake according to weight gain and physical activity**
- **Changes in diet should be based on more frequent, lighter meals, often with an appetizer, while optimizing the quality of ingested carbohydrates, fats, and proteins**
- **Do not go more than eight hours between meals**

In recent years, widespread unhealthy eating habits in the general population are causing an increase in the global prevalence of obesity and diabetes. This epidemic is also reflected in an increased prevalence of GDM, estimated to affect around 16% of all pregnancies, depending on the population. One of the most important measures that should be adopted to reduce the current trend is to prevent obesity from starting in childhood. Education is a building block of GDM management.

It is calculated that GDM can be controlled in 70-85% of cases simply by making changes in lifestyle [45]. Treatment of GDM should begin with a nutritional plan and physical activity. A good diet for a pregnant woman includes a variety of high-quality foods in appropriate-size servings. It is not recommended that women lose weight during pregnancy, even obese women.

The 2007 ALAD guidelines recommend the following nutritional plan for women with GDM:

In the first trimester, total caloric intake is calculated according to body weight and level of physical activity. Starting in the second trimester, 300 kcals are added to daily energy consumption. It is necessary to control maternal weight gain and adjust total caloric intake by making the appropriate adjustments in diet. It is not recommended to reduce total daily caloric intake to below 1,800 kcal. In case of multi-fetal pregnancies, it is recommended to add 450 kcal/day, starting in the second trimester; caloric intake depends on the weight gained by the pregnant woman. Salt intake should be no less than 5 g/day (2 g of sodium/day), minimally restricted in the case of salt-sensitive hypertension or cardiac insufficiency. Daily intake of iodine should be 0.2 mg. The frequency of meals will depend on local customs; however, it is recommended that the period between the last meal of the evening and breakfast should not exceed 6-8 hours.

Physical exercise

Key points:

- **Physical activity and exercise have a protective effect against the onset of GDM and type 2 diabetes**
- **Physical activity has a positive effect on the control of GDM and diabetes**

Among the therapeutic options considered, physical activity and regular physical exercise are one of the most important measures for the prevention and control of type 2 diabetes. Physical activity improves control of blood glucose, lipoproteins, blood pressure, and cardiovascular health, and reduces mortality and improves quality of life[46]. Exercise, combined with medical management, has proven to improve the control of GDM [47–49].

EVALUATION OF IADPSG STANDARDS IN BUENOS AIRES (ARGENTINA)

The Diabetes and Pregnancy Committee of the Argentine Diabetes Society (SAD) conducted a multicentric study to compare various diagnostic criteria for GDM. The criteria issued in 2008 by the Latin American Diabetes Association (ALAD) (fasting blood glucose ≥ 5.6 mmol/l, ≥ 100 mg/dl; or two hours after glucose overload 7.8 mmol/l ≥ 140 mg/dl) were compared with the IADPSG criteria (fasting blood glucose ≥ 5.1 mmol/l, ≥ 92 mg/dl; or two hours after glucose overload ≥ 8.5 mmol/l ≥ 153 mg/dl). The study is still in progress, but the preliminary results of data on 927 pregnant women indicate that GDM prevalence was 10.36% using ALAD 2008 thresholds, compared to 26.7% with IADPSG cut-off values. The positive predictive value for macrosomia was 11.46 according to ALAD standards and 10.67 according to IADPSG standards. The number of GDM cases and the number of cases needing treatment will double if IADPSG standards are used instead of ALAD standards.

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There is a consensus among many organizations that treatment of GDM should start with a nutritional plan and physical activity, and that medication should be prescribed if glycemic control is not achieved [20,50]. Clinical trials on exercise and GDM remain scarce. Most available reports are from observational studies that evaluate the efficacy of physical activity in the prevention of GDM [51,52]. All these studies have demonstrated that physical activity in pregnant women was inversely related to developing GDM [53].

A systematic review of recently published randomized clinical trials showed that the risk of developing GDM was 28% lower (9-42%, CI 95%) in the group of pregnant women who engaged in some kind of physical exercise. This suggests that physical activity during pregnancy has a protective effect against GDM [49].

In the cases of diagnosed GDM, exercise seems to increase muscle mass and thus improve glycemic control, increase cellular sensitivity to insulin [54,55], and reduce the incidence of fetal macrosomia [56,57]. It has also been demonstrated that exercise reduces the future likelihood of women with GDM developing type 2 diabetes [58].

Medical treatment

Key points:

- **Not all cases of GDM are treated with insulin in the Americas**
- **The objective of medical treatment is to maintain blood glucose as close to normal as possible**
- **There is a trend toward using OHA in GDM, but still no consensus or supporting evidence**

The ADA guidelines for GDM management state that insulin is the preferred agent for the treatment of diabetes in pregnancy, due to the lack of data on the long-term safety of other types of agents [20]. The physiology of pregnancy requires frequent adjustment of insulin doses to meet changing requirements: Toward the end of the first trimester, there tends to be a reduction in the daily total dose of insulin; in the second trimester, insulin resistance grows rapidly, which means that a weekly or biweekly increase in the dose of insulin is required to achieve glycemic goals. In general, a proportion of the total daily dosage should be administered as basal insulin and another part as prandial insulin. Due to the complexity of insulin management during pregnancy, referral to a specialized center is recommended, if possible. All types of insulin are teratogenic category B drugs, except for insulin glargine and insulin glulisine, which are category C (according to the ADA evidence-grading system) [45].

However, recent randomized testing supports the efficacy and short-term safety of glibenclamide [59] (ADA category B) and metformin [60,61] (ADA category B) for the treatment of GDM. Nevertheless, both agents pass through the placenta and there is no data on their long-term safety [62].

NPH human insulin is the preferred treatment for a basal regimen of three, four, or more daily rapid subcutaneous injections [63–65]. Another option may be rapid-acting insulin analogs (Aspart and Lispro), in particular for women with type 1 diabetes, if good control of postprandial glycemic peaks is not achieved in intensive regimens with human insulin or in the case of severe nocturnal hypoglycemia. Detemir, a long-acting analog, continues to be used if it had achieved good metabolic control prior to pregnancy. These three drugs have been approved by the FDA for use during pregnancy (ADA category B), but not by the health regulatory authorities in all the countries of the Region. In this regard, studies of their cost-effectiveness are needed. Furthermore, in recent years studies have been done on the use of OHAs such as metformin and glibenclamide (especially in GDM), but there

is still no consensus on the use of metformin in GDM [61]. The arguments in favor of using OHAs are that they are inexpensive and user-friendly for physicians and patients, but they often require added insulin for the necessary glycemic control. Until more scientific evidence is available on their benefits and risks, and until their use is definitively approved, this must be discussed with the patient, whose consent is required.

Diabetes in pregnancy also requires detection and treatment of associated infections, hypertension, and chronic vascular complications. Exhaustive fetal surveillance should be conducted and newborns should receive adequate obstetric care and immediate evaluation.

Future risk for mother and child: Maternal health and noncommunicable diseases

Key points:

- **Closer attention should be paid to the links between maternal health and noncommunicable diseases**
- **All pregnant women should be examined to detect hyperglycemia in pregnancy**
- **Whenever possible, IADPSG/ WHO criteria should be used to diagnose diabetes in pregnancy**

Increased frequency of GDM is accompanied by similar increases in the prevalence of impaired glucose tolerance (IGT), obesity, and type 2 diabetes (T2DM) in a given population.

GDM is associated with a higher incidence of maternal, perinatal, neonatal morbidity, caesarean sections, shoulder dystocia, injuries in childbirth, hypertensive disorders of pregnancy (including preeclampsia), and the later development of T2DM. Long-term sequelae include a greater future risk of obesity and diabetes, both for mother and offspring.

In countries with limited resources, women are often not screened sufficiently to detect diabetes in pregnancy. Countries with limited resources have 80% of the burden of diabetes worldwide, with over 90% of maternal and perinatal deaths, and negative outcomes of pregnancy. The importance of GDM prevention lies in the links between hyperglycemia and negative outcomes of pregnancy, alterations in the imprinting of certain genes in the offspring of mothers with GDM, and a potential increased risk of the metabolic and cardiac complications of diabetes. Disorders in children whose mothers had GDM during pregnancy, as well as mothers' increased future vulnerability to diabetes and cardiovascular disorders make it necessary to prevent, screen, diagnose, and treat hyperglycemia in pregnancy.

Gestational diabetes: Puerperium

Key points:

- **Women with GDM should be reclassified six weeks after delivery, using a diagnostic test for diabetes (fasting blood glucose, 2-hr OGTT, or A1c test)**
- **Women who have had GDM have a 50% risk of developing DM later in life**
- **The adoption of a healthy lifestyle should be recommended to reduce the future risk of DM**

Women with GDM have a high risk of contracting diabetes after delivery. Management of GDM in puerperium requires clinical reevaluation as well as nutritional therapy.

Patients with GDM should be reclassified at the beginning of the sixth week after delivery. Patients are reclassified with a 75-g OGTT, following WHO standards for the diagnosis of DM in non-pregnant adults, based on their blood glucose level two hours after the administration of glucose.

Women with a history of GDM are more susceptible to contracting type 2 diabetes than women who have pregnancies with normal glucose levels[66]. Studies of how glucose acts early in puerperium have revealed up to 38% prevalence of type 2 diabetes in the first year after delivery[65] and up to 60% in follow-ups with women 16 years after delivery [67]. In women with GDM, puerperium is a very important time to determine the risk of having type 2 diabetes in the future, so it is more than justifiable to take preventive measures at this stage in life. Patients who have had normal test results during puerperium should be recommended to maintain healthy eating habits, engage in physical activity, and undergo annual metabolic monitoring.

Fetal programming

Key points:

- **Exposure to maternal obesity, with or without gestational diabetes, increases the risk of childhood obesity**
- **High birth weight also poses a higher risk of childhood and adult obesity**
- **It is recommended to offer care that integrates a proper diet and optimal weight gain in pregnancy, management of gestational diabetes, and newborn diet plans aimed at preventing harmful outcomes that result in adult obesity**

The prevalence of type 2 diabetes, like obesity, is increasing around the world. Obstetricians are faced with a clear and continuous increase in the prevalence of obesity and gestational diabetes in pregnant women (~30%). It is increasingly recognized that the risk of obesity in adults is clearly influenced by environmental exposure in the womb and after birth, in particular due to diet. This principle is fundamental to developmental programming[68].

Exposure to maternal obesity, with or without gestational diabetes, or being overweight at birth also implies a greater risk of childhood and adult obesity. In particular, low birth weight together with accelerated child growth is associated with a significant risk of adult obesity. Animal models have reproduced human epidemiological results, shedding light on potential programming mechanisms, such as the alteration of organ development, cellular signaling responses, and epigenetic modifications. Based on a model of a fat-rich maternal diet (maternal obesity) and maternal malnutrition (low birth weight) in rats, it has been demonstrated that these changes in diet result in greater hyperphagia and adiposity in offspring, as well as insulin resistance and hypertriglyceridemia[69,5]. Specifically, offspring subject to both types of nutritional stress show changes toward more appetite neurons in proportion to satiety neurons, and higher content of adipose cells. Underlying mechanisms include changes in progenitor cells and their different insulin response (proliferation and differentiation diminish in neural progenitor cells and increase in preadipocytes). Furthermore, response to exogenous insulin diminished in neural progenitor cells and increased in adipocytes.

Prenatal care has advanced considerably by focusing on maternal, fetal, and neonatal health, and there is now an opportunity for interventions that can prevent or reduce childhood and adult obesity. It is expected that guidelines recommending a proper diet and optimal weight in pregnancy, treatment of GDM, and newborn diet plans will help reduce the long-term consequences of hyperglycemia in pregnancy, especially obesity.

FEASIBILITY OF UNIVERSAL SCREENING FOR GDM IN LIMA (PERU)

This project sought to calculate the prevalence of GDM using the IADPSG criteria and evaluate the association between GDM and maternal body mass index (BMI) before pregnancy and at the midpoint in pregnancy. A 75-g 2-hr OGTT was administered between weeks 24 and 28 of pregnancy to 1,282 women receiving prenatal care in the Maternal and Perinatal National Institute in Lima (Peru). The associations between GDM and maternal BMI were calculated. In general, the prevalence of GDM was 16% (14-18%, CI 95%). The prevalence of GDM in thin (BMI at midpoint in pregnancy <25 kg/m2), overweight (25-29.9 kg/m2) and obese (≥ 30 kg/m2) women was 12%, 15%, and 22%, respectively. In comparison with thin women, prevalence ratio (PR) of GDM for extremely obese women (BMI at midpoint in pregnancy ≥ 35 kg/m2) was 2.3 (CI 95% 1.3-3.8). Compared with the youngest mothers (<20 years), those ≥ 35 years showed 1.6 times higher prevalence of GDM (PR = 1.6; CI 95% 1.1-1.8). Furthermore, a history of diabetes in first-degree relatives was related to a higher prevalence of GDM (PR = 1.4; CI 95% 1.2-2.5). The prevalence of GDM in Lima matches the internationally reported calculations based on IADPSG criteria. The evidence documenting the burden of GDM and its association with maternal obesity has important clinical and public health implications.

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Teamwork session

The participants were asked to respond to the following three questions:

1. In your opinion, what are the barriers for improving prevention, screening and management of diabetes related to pregnancy?
2. Identify activities and actors for a plan to overcome barriers for the control of diabetes related to pregnancy?
3. What are the next steps that should be taken in your country or subregion to improve the control of gestational diabetes?

Their answers to these three questions are summarized below.

In your opinion, what are the barriers for improving prevention, screening and management of diabetes related to pregnancy?

Health care organization

- Fragmented health systems
- Lack of training at the first level of health care
- Insufficient financial resources. Inequality and difficulties in the availability, distribution, and continuity of delivery of supplies (strips, insulin, etc.)
- Health personnel lack commitment and continuity (frequent changes)
- High cost of medical care for pregnant women with diabetes (leading to self-monitoring and self-treatment)
- Weaknesses at first level of health care and in pre-conception and postpartum check-ups (prevention of diabetes in future pregnancies and for the rest of a woman's life)
- Lack of training for health care teams (physician, midwives, nurses, nutritionists, physical therapists)

Community resources, public policies, creation of networks, communication

- Lack of political will and commitment
- Insufficient civil society participation
- Inadequate regulation of the social environment (obesity, processed food, food labeling)
- Lack of health care policies aimed at chronic diseases
- Limited links between organizations and public entities

Guidelines, protocols, and research

- Lack of mechanisms to incorporate clinical practice guidelines (CPGs) into medical health care
- Lack of regional lines of research
- Lack of clinical practice protocols and guidelines
- Poor adherence to CPGs and protocols
- No monitoring of the cost-effectiveness of results (using CPGs)
- Lack of consensus or communication between scientific and professional associations (i.e., obstetrics and diabetes societies) and health ministries, or among the different societies that formulate and publish recommendations without reaching mutual agreement
- Poor dissemination of CPGs for the management and treatment of GDM
- Administrative problems in obstetrics departments (in terms of setting and meeting criteria for the surveillance of pregnancy in women with diabetes, and reducing the high rate of unnecessary caesarean sections)

AN EDUCATIONAL INTERVENTION FOR GDM IN ARGENTINA

An educational intervention was carried out with women with gestational diabetes in Argentina in order to:

- Improve the quality of care and perinatal outcomes in women affected by GDM;
- Reduce the incidence of maternal and neonatal hospitalization related to treatment;
- Provide women with the necessary knowledge, skills, and attitudes to delay and minimize progression toward T2DM.

Eight-hour workshops were held, with eight pregnant women participating in each one. Diabetes-related issues were addressed through participatory activities and demonstrations. Clinical tests and measurements were also carried out, including anthropometry, blood pressure, glycemic profile, and adjustment of medical treatment. The pregnant women also participated in physical activity sessions organized by a multidisciplinary team. The intervention was evaluated through various questionnaires, one of which reviewed their knowledge of DM, depression and well-being (WHO-5), quality of life (EQ-5D), and satisfaction. Project evaluation also included an analysis of clinical histories, house calls, and consultations in the physician's office. The reference group was made up of pregnant women who were receiving the usual care in their health centers. The intervention was carried out between 1 January 2009 and 31 December 2011. Results: In total, 43 pregnant women participated, with an average age of 31.8 years (± 6.5) and average BMI 32.5 (± 7.3) kg/m2; knowledge questionnaires 13.8 ± 3.5 versus 16.8 ± 2.6 ($p < 0.000$), 58%. Text messages were used to adjust treatment, with satisfactory results. All process indicators improved, including BMI, eye exam, EKG and proteinuria, $p < 0.01$. The number of neonatal hospitalizations significantly declined in the intervention group compared with the reference group (OR = 0.77, CI 95%, 0.27-2.18), as did caesarean sections (OR = 0.61, CI 95%, 0.22-1.68). Conclusions: The educational program for pregnant women effectively reduced the complications associated with GDM.

Contact: Silvia Lapertosa (dralapertosa@hotmail.com)

Health services delivery

- Outdated standards in health systems
- Limited human resources and lack of training; disorganized and highly complex referral and counter-referral system
- Inappropriate relationships between health care levels
- Missed opportunities in cases of spontaneous demand: rejecting demand and prioritizing scheduled shifts with very different schedules (missed consultations)

Support for self-management

- Erroneous ideas about diabetes and aspects of care
- Lack of a popular "healthy lifestyle culture" in our Region
- Poor dissemination of educational materials on healthy childhood, incorporating concepts of a healthy lifestyle in primary and secondary school settings, and at universities, workplaces, etc.
- Lack of standardized educational programs for the integrated management of pregnant women with diabetes (physical activity, healthy diet, management of insulin therapy)
- Lack of culturally appropriate programs for individual and group education adapted to local conditions
- Lack of health education programs in the communications media

Information system

- Lack of data on the prevalence of diabetes and gestational diabetes and the frequency of LGA and SGA.
- Lack of regional data on the epidemiology of gestational diabetes and its impact on maternal and perinatal morbidity and mortality, and on the burden of disease at all stages of life
- Inadequate surveillance and monitoring systems

dentify activities and actors for a plan to overcome barriers for the control of diabetes related to pregnancy?

Organization of health care

- Promote universal screening for diabetes in all pregnant women in the first prenatal visit and between weeks 24 and 28 of pregnancy
- Ensure timely, comprehensive, and universal access to health care for pregnant women with a view to the prevention and control of diabetes in pregnancy
- Include chronic diseases in the health ministry budgets
- Create links among government programs (reproductive health, noncommunicable chronic diseases)
- Develop an appropriate setting (supplier network, logistical support and infrastructure, medical and academic experts)
- Improve financing of programs for diabetes prevention and control
- Improve staff expertise through continuing medical education

NUEVA VIDA PROJECT: DETECTION AND TREATMENT OF GESTATIONAL DIABETES IN BARRANQUILLA (COLOMBIA)

Up-to-date global criteria and standards for the treatment of GDM have long been overlooked or have been poorly implemented. The turning point in this regard was the design and implementation of the Nueva Vida (New Life in English) project in Barranquilla. The objectives of the project were to improve the detection and treatment of GDM in Barranquilla, through the development, implementation, and monitoring of clinical guides, as well as training for health professionals. Universal screening and awareness-raising campaigns were implemented in an attempt to ensure that the target population was screened using the fasting glucose measurement in the first visit and an OGTT between week 24 and 28 of pregnancy, in accordance with the clinical detection and treatment guidelines developed for this purpose. The criteria for diagnosis were: fasting glucose ≥ 92 mg/dl (5.1 mmol/l); one hour after administration of glucose ≥ 180 mg/dl (10.0 mmol/l); and two hours later ≥ 153 mg/dl (8.5 mmol/l). Fasting blood glucose ≥ 126 mg/dl (7.0 mmol/l) is considered to indicate preexisting diabetes. Women diagnosed with GDM were referred to treatment and participated in three educational group sessions. To accomplish this, training was provided to 72% of primary care staff and obstetricians in the public health system; 1,269 community health agents were trained in GDM and standards of care. The Nueva Vida project sent 21,169 pregnant women for screening, 1,853 of whom were diagnosed with GDM, for a prevalence of 8.8%. Among the women diagnosed, 29% showed no risk factors; four out of five pregnant women who visited the public health centers were educated about GDM and healthy lifestyles, for a total of 28,687 beneficiaries. Nueva Vida educated 709 pregnant women with GDM in three-day workshops and 90% of diagnosed women received nutritional guidance at home. Universal screening is the key. Community health agents can effectively empower women with GDM and improve their adherence to treatment.

Contact: Humberto Mendoza (humberto.mendoza@yahoo.es)

- Promote research on diabetes in pregnancy
- Strengthen primary and secondary prevention of gestational diabetes
- Mitigate shortage of specialists, especially the deficit generated by the migrations of the physicians
- Guarantee a focus on improving quality of care, including indicators related to screening and treatment of diabetes in pregnancy and puerperium
- Guarantee sufficient personnel, equipment, and supplies
- Provide information to the countries through the PAHO Strategic Fund
- Universities, the academic community, scientific societies, and medical schools should ensure that health professionals receive education that provides them with the necessary competencies for managing the prevention and control of diabetes in pregnancy
- Conduct research, training, and professional development in collaboration with health ministries
- Evaluate the need to create specialized health services for pregnant women with diabetes
- Promote exchanges between countries and the support from international organizations such as PAHO, International Diabetes Federation, World Bank, and Inter-American Development Bank

Community resources, public policies, creation of networks, and communication

- Promote public policy-making for the prevention and control of diabetes in pregnancy, with reference to the conclusions of the Pan American Conference on Diabetes and Pregnancy
- Produce regulations and policies (food industry and environmental guidelines and interventions) that facilitate the adoption of healthy lifestyles, including a healthy diet and physical activity
- Promote strategic partnerships with other sectors (education, finance, culture, agriculture, NGOs, universities, social forums, lawmakers, and private sector) to prepare plans and programs that support the prevention and control of diabetes in pregnancy
- Establish tax regulations for highly processed foods, alcoholic beverages, and tobacco
- Fund diabetes prevention and treatment
- Set a clear national policy for gestational diabetes and diabetes in pregnancy
- Require food labeling that facilitates a good, healthy diet
- Ensure that gestational diabetes and diabetes in pregnancy are included in the government agenda
- The health ministry should be the integrating and the regulating body for national policy for the prevention, detection, and treatment of gestational diabetes and of overt diabetes
- In remote areas, promote visits by community members to patients with or at risk of having diabetes in pregnancy
- Implement effective mechanisms for ongoing communication between countries and subregions
- Organize a network to ensure the implementation of priority lines of research in the Region
- Communicate through the mass media (e.g., health alerts in diabetes-related emergencies)
- Promote work on GDM through regional health agencies: Hipólito Unanue Agreement, MERCOSUR, CARICOM, RESSCAD

Guidelines, protocols, and research

- Produce, update, adapt or adopt, and establish clinical practice guidelines for the prevention and control of diabetes in pregnancy
- Promote continuing medical education involving universities and scientific societies
- Create programs for continuing education at different levels of health care service providers
- Provide continuing training to midwives, nurse-midwives, and perinatal health care workers
- Offer training to health care teams and campaigns to educate women of reproductive age and pregnant women
- Training of trainers in the management of

pregnant women with diabetes
- Form facilitating sites for dissemination and implementation of clinical practice guidelines in each institution of first, second, and third level of health-care
- Consider research needs, in particular specific glycemic thresholds for the diagnosis of hyperglycemia in pregnancy

Health services delivery

- Improve or strengthen the referral/counter-referral system.
- Increase pre-gestational and early prenatal consultations.
- Guarantee the entire care, contraception, and family planning process.
- Ensure a hyperglycemia screening program that covers all women, from the pre-gestational and prenatal stages through to puerperium.
- Strengthen health units for the treatment and control of diabetes in pregnancy.
- Improve the coordination of the different levels of health care or promote the creation of support units.

Support for self-management

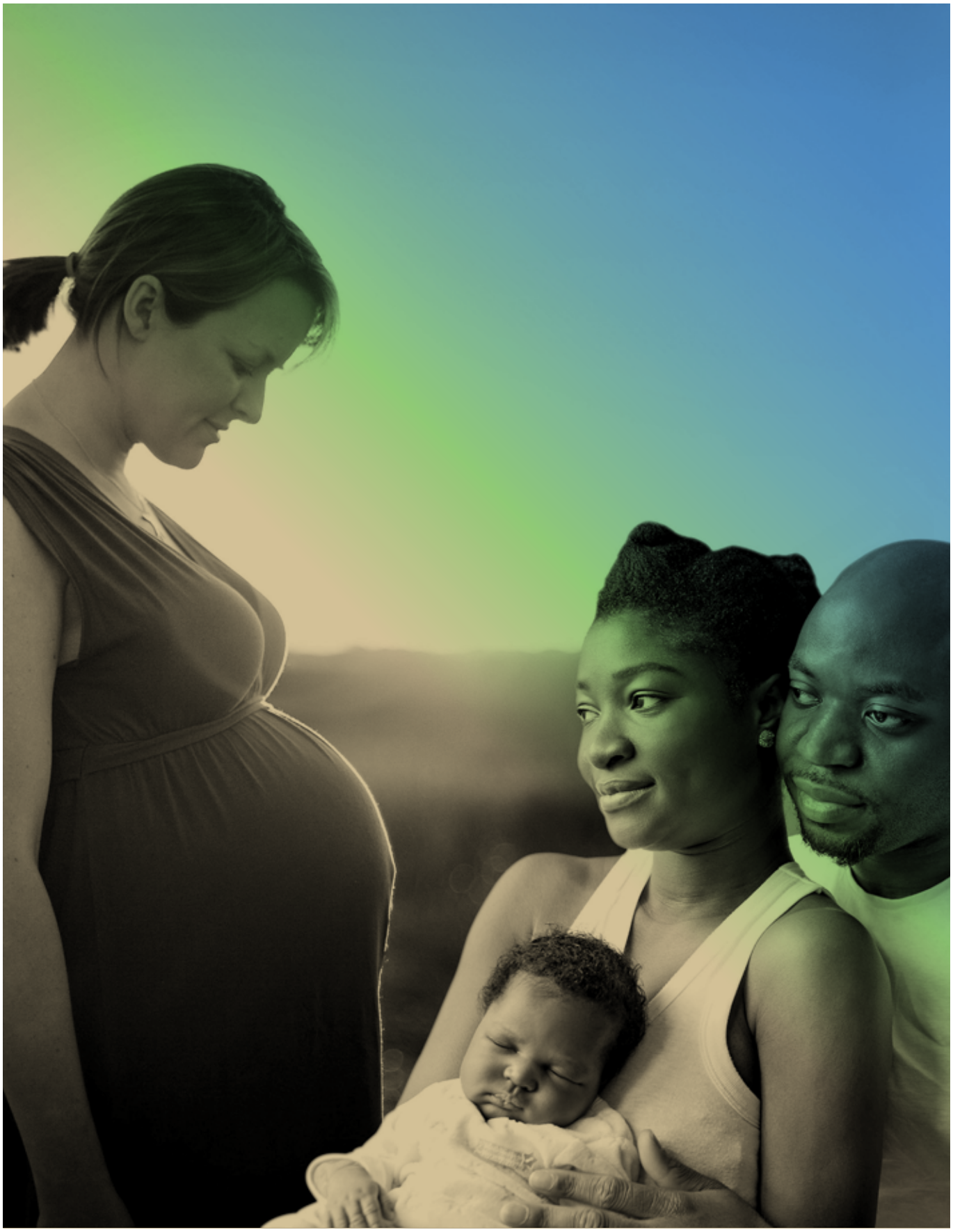
- Promote healthy lifestyles in the early stages of life, starting in primary and secondary school.
- Launch education programs that include aspects of the prevention, detection, and treatment of diabetes in pregnancy, including healthy food preparation and the promotion of physical activity.
- Promote healthy lifestyles for the prevention of diabetes in general and during pregnancy in particular.
- Increase access to mass media and opportunities to promote health.
- Sensitize and motivate the population to systematically engage in physical activity.
- Strengthen orientation and guidance programs with participatory education for patients with gestational diabetes and their family members
- Promote training for community groups with a view to education in self-management: in particular, community health promoters can raise the level of awareness and educate pregnant women and their families about the prevention and self-management of gestational diabetes
- Involve public personalities and leaders of medical and scientific societies in educational campaigns on diabetes in pregnancy
- Use available local information systems to communicate with patients through written messages, radio, or television and, in particular, using social networks and cell phones

Monitoring and information system

- Collect data on diabetes in pregnancy, using the data collection tool created for the Pan American Conference on Diabetes and Pregnancy.
- Promote the use of epidemiological information to generate health policies on diabetes in pregnancy.
- Carry out a periodic evaluation of information systems and of the data necessary for monitoring diabetes during pregnancy.
- Support the design of a computerized system for the management of chronic diseases

What are the next steps that should be taken in your country or subregion to improve the control of gestational diabetes?

1. Report to the ministries of health on the topics addressed in the Pan American Conference on Diabetes and Pregnancy, and on the need to take concrete measures according to the specific needs of each country.
2. Disseminate the results of the conference by organizing a meeting on diabetes and pregnancy to explain the technical issues addressed in the conference, with the participation of all stakeholders (public and private sectors, academia, NGOs, social support groups, community leaders, and mass media).
3. Review national policies that address diabetes and pregnancy, in particular to ensure that they recommend that women be screened for diabetes in the first prenatal visit and between weeks 24 and 28 of pregnancy.
4. Identify which community organizations could support the dissemination of information on diabetes and pregnancy.
5. Promote universal access to diabetes screening during pregnancy and to prevention programs within the framework of national health services, social security system, and private sector.
6. Examine the status of the prevention, screening, and treatment of hyperglycemia in pregnancy, and:
   a. Modify, update, or formulate guidelines and protocols for national-level implementation by public and private health care providers, private insurers, and social security systems.
   b. Evaluate the screening and care of hyperglycemia in pregnancy, with attention to points of access, treatment of gestational diabetes, referral/cross-referral mechanisms, quality improvement strategies, and availability of specialized services.
   c. Launch an educational program that includes information on the risks of acquiring diabetes (both mother and child) and on the prevention and treatment of diabetes in pregnancy and throughout life.
   d. Evaluate existing national data within the current information system, as well as the need to improve data collection to support the evaluation and improvement of screening and care for diabetes in pregnancy.
   e. Ensure that health professionals receive training on the prevention, screening, and treatment of hyperglycemia in pregnancy.



Conclusions of the conference

- Untreated hyperglycemia in pregnancy increases risks for mother and child.
- The 2013 WHO/IADPSG guidelines are based on adverse maternal and perinatal outcomes that reflect the association between maternal glucose levels and adverse outcomes both for women and their babies during pregnancy and puerperium.
- The WHO group that formulated the criteria for diagnosing hyperglycemia first detected in pregnancy reached the conclusion that any established threshold would be arbitrary and that values should be based on the capacity of each country.
- The most recent IADPSG/WHO diagnostic recommendations are based on fasting blood glucose associated with an oral glucose tolerance test after administration of an oral 75-g glucose load (75-g OGTT).
- Compilation of the information received from LAC countries through the conference survey reveals a diversity of standards for the screening and diagnosis of hyperglycemia in pregnancy. This makes it difficult to compare the frequency of GDM among countries.
- From the 37 consulted PAHO Member States only 15 (41%) reported having policies for the screening of diabetes in pregnancy.
- Overall 67% of PAHO Member States reported having clinical practice guidelines for the screening and diagnosis of hyperglycemia in pregnancy; however, there is no uniformity in their strategies and diagnostic thresholds. Fasting blood glucose thresholds for GDM diagnosis vary from country to country, the lowest being 92 mg/dl in Canada, Colombia, Cuba, Guatemala, Nicaragua, Peru, and the United States.
- In 10 countries, screening for hyperglycemia in pregnancy is based on a 75-g OGTT.
- Nutritional guidance is recommended for GDM, together with physical exercise and medical treatment to lower blood glucose and reduce the risks for mother and child.
- Pregnancy offers an opportunity to reduce obesity-related morbidity and mortality, thereby also improving the health of future generations.

Recommendations of the conference

- ✓ Hold activities to raise awareness throughout the Region of the Americas regarding the importance of programs for the prevention and control of hyperglycemia in pregnancy.
- ✓ Implement, as much as possible, the most recent WHO guidelines recommending screening for hyperglycemia in the first prenatal visit and between weeks 24 and 28 of pregnancy. Blood glucose levels can be determined either during fasting or through a 75-g OGTT in which blood glucose is measured after one hour and two hours.
- ✓ Launch programs to improve the treatment of hyperglycemia in pregnancy, including a healthy diet, physical exercise, and medical treatment.
- ✓ Promote greater capacity for the prevention and control of GDM, including the adoption, review, or implementation of clinical practice guidelines
- ✓ Begin compiling health system data or enhancing data collection, and improve access.
- ✓ Hold national meetings in which specific needs and future plans are discussed with stakeholders, policy-makers, the scientific community, civil society, and health care providers.
- ✓ Disseminate the call for action in all Member States, emphasizing the importance of controlling hyperglycemia in pregnancy: a necessary investment for ensuring a healthy future for the population of the Americas.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Hyperglycemia in pregnancy: A call to action for improved outcomes

Hyperglycemia first detected in pregnancy is classified as DM or GDM, according to the degree of hyperglycemia. In the Americas, it is calculated that 11-12% of pregnant women develop hyperglycemia in pregnancy. Many cases are not diagnosed or treated, leading to significant negative impacts on the health of mothers and children. WHO guidelines are based on IADPSG standards derived from the HAPO study. Furthermore, the WHO guidelines incorporate recent evidence and offer a good opportunity to standardize diagnostic methods and for better control of hyperglycemia in pregnancy. These guidelines are based on short-term adverse maternal and perinatal outcomes, and recognize an association between maternal blood glucose levels and negative outcomes in pregnancy and puerperium. The implications of these recommendations should be considered in the context of the health situation in each country. Although there is growing international consensus concerning the criteria for diagnosis of hyperglycemia first detected in pregnancy, these criteria can be difficult to implement in certain countries due to a lack of resources. As a result, effective detection strategies and available health resources should be taken into account. Effective and feasible solutions to this problem involve diagnosing diabetes and providing guidance to women on nutrition, physical activity and, if necessary, medication to control blood glucose during pregnancy. To accomplish this, it is necessary to increase the awareness and understanding of patients and medical staff, while promoting healthy lifestyles and improved access to care and medicines. We all play a role in safeguarding the health of mothers and newborns!

Why is hyperglycemia in pregnancy a health problem?

Untreated hyperglycemia in pregnancy has considerable harmful impacts:

- Untreated hyperglycemia in pregnancy increases maternal risk of future glucose intolerance or diabetes and can cause metabolic syndrome with potential development of cardiovascular disease.
- It has been demonstrated that untreated hyperglycemia in pregnancy increases the risk of obstetric problems such as miscarriages and preeclampsia, as well as premature childbirth and caesarean section associated with large (macrosomic) babies.
- Untreated maternal hyperglycemia can lead to fetal malformations in the case of diabetes, as well as perinatal problems such as neonatal hypoglycemia and, if birth is premature, respiratory problems and jaundice. The baby's large size can cause injuries during delivery (occasionally shoulder dystocia and even Erb's palsy). All of this can increase the need for neonatal care.
- In the long run, offspring with intrauterine exposure to hyperglycemia may have higher risk of obesity, insulin resistance, and glucose intolerance, especially in the case of macrosomia.
- Due to the negative health impact of hyperglycemia, pregnancy offers an opportunity to improve health, reduce obesity-related maternal morbidity and mortality, and improve the child's future health and well-being.

The burden of diabetes in pregnancy in the Americas

In the Region of the Americas, hyperglycemia affects an estimated 11-12% of pregnancies (adjusted prevalence of 11.9% and 11.5% in the North America-Caribbean and South-Central America subregions, respectively), corresponding to GDM in about 85% of these cases. In certain high-risk populations, such as those with a high prevalence of obesity or diabetes in women, the prevalence of hyperglycemia in pregnancy may be even higher.

Despite the importance of this health problem:

- 45% of countries in the Region lack screening policies for hyperglycemia in pregnancy.
- Although 65% of countries supposedly follow some type of standard for hyperglycemia screening in pregnancy, they use highly diverse glucose doses and cut-off values. Only seven countries of the Region follow the WHO/IADPSG standards for GDM diagnosis.
- As there is no universally accepted diagnostic criterion for GDM and different standards are used in the Region, it is not possible to compare the prevalence of GDM among the different countries.
- Only three countries have national programs for GDM prevention.
- Most of the countries in the Region need information on monitoring hyperglycemia in pregnancy and on the most common outcomes for mothers and babies.
- Most medical staff do not systematically monitor women's blood glucose during pregnancy and do not offer guidance on diabetes prevention.

Recommendations for health workers

The participants in the conference recommended that women should be screened for diabetes in the first prenatal visit and between weeks 24 and 28 of pregnancy.

- WHO guidelines recommend that the diagnosis of diabetes in pregnancy should be based on the same criteria as that used for women who are not pregnant.
- Diagnostic recommendations should be based on the fasting blood glucose test or 75-g OGTT.
- Immediately after diagnosing DM or GDM, nutritional treatment should be initiated and recommendations made for physical exercise, along with medical treatment aimed at lowering blood glucose to as close as possible to normal levels, in order to reduce risk for mother and child.

Measures to be taken by health authorities and health professionals

The participants in the conference agreed on the following recommendations:

- Raise awareness of the importance of implementing control programs for better treatment of hyperglycemia in pregnancy, including universal screening.
- Build capacities for the prevention and control of hyperglycemia in pregnancy, including:
  - adopting, reviewing, or implementing clinical practice guidelines

  - improving or launching data collection and monitoring within the health system
  - guaranteeing access to care for mothers and children.
- Launch programs to improve control of hyperglycemia in pregnancy, including nutrition, physical exercise, and medical treatment.
- Recommend screening for hyperglycemia with a fasting blood glucose test in the first prenatal visit in order to identify preexisting diabetes; and between weeks 24 and 28 of pregnancy using a fasting blood glucose test or 75-g OGTT (measuring blood glucose one hour and two hours after taking glucose) in order to rule out GDM.
- Follow the 2013 WHO guidelines for GDM diagnosis [fasting glucose 5.1-6.9 mmol (92-125 mg/dl); one hour after taking glucose ≥ 10.0 mmol/l (180 mg/dl); and two hours after taking glucose 8.5-11.0 mmol/l (153-199 mg/dl)], if possible; otherwise, set values according to the country's capacity after consultation with the appropriate experts.
- Follow the 2013 WHO guidelines for diagnosis of diabetes in pregnancy: (fasting glucose ≥ 7.0 mmol/l (126 mg/dl); or OGTT two hours after taking glucose (or random measurement of blood glucose) ≥ 11.1 mmol/l (200 mg/dl).
- Hold national and subregional meetings with stakeholders, policy-makers, the scientific community, civil society, and health workers to identify specific needs and future plans.

Action that the PAHO/WHO secretariat should take

As the lead international public health organization in the Region, PAHO/WHO should:

- Lend technical support to the Member States in the implementation of programs for diabetes prevention and control in pregnancy
- Monitor the implementation of new policies and programs, repeating the diabetes and hyperglycemia survey annually or every two years.

Annex 1.

Data Collection Form Diabetes & Pregnancy

This data collection form must be completed with the most recent data available. Please include any available reference for the data provided. This form can be filed on line using the following link: https://www.surveymonkey.com/r/2T3KQ3M If completed electronically or in hard copy, please send it to the PAHO local office or to barceloa@paho.org Please contact us if you find any difficulty of have any question.

Column	Description
Question	Read each question carefully. It may be necessary for you to obtain some of the requested information from another organization, department or institution. Please provide the name and organization of other person(s) providing information for each section of the questionnaire. All persons and departments listed will be included as contributor in any document prepared with the provided data. Some of the requested information may not be available in some countries, however, please complete and submit to the best of your ability. Please include in the comment boxes any additional information you would like to share.
Glossary	*LGA (Large for gestational age):* newborn larger than expected for the gestational age (birth weight >90th percentile). *Macrosomia:* newborn birth weight >4kg. *SGA (Small for gestational age):* newborn birth smaller than expected for their gestational age (birth weight <10th percentile). OGTT: Oral Glucose Tolerance Test Scope of policies, guidelines, etc. The word "Regional" referrers to levels other than national such as state, department, province, municipality, etc. Hyperglycemia first detected at any time during pregnancy should be classified as either: Diabetes Mellitus in pregnancy (DMP, WHO recommendation 2) or Gestational Diabetes Mellitus (GDM, WHO recommendation 3)*

Test	Glucose Load	Gestational DM (DMG) (Recommendation 3)	DM in pregnancy (DMP) (Recommendation 2)
Fasting plasma glucose	-	5.1-6.9 mmol/l (92 -125 mg/dl)	≥ 7.0 mmol/l (126 mg/ dl)
1-hour plasma glucose	75g	≥ 10.0 mmol/l (180 mg/dl)	-
2-hour plasma glucose	75g	8.5-11.0 mmol/l (153 -199mg/dl)	≥ 11.1 mmol/l (200 mg/dl)
Random glucose	-	-	≥ 11.1 mmol/l (200 mg/ dl)

*Reference: World Health Organization. Diagnostic Criteria and Classification of Hyperglycaemia First Detected in Pregnancy. Geneva 2013. Available at http://www.who.int/iris/bitstream/10665/85975/1/WHO_NMH_MND_13.2_eng.pdf?ua=1

Section A: General Information

	Question	Answer
1	Country	
2	Name of person reporting	
3	Institution/ Organization	
4	Position	
5	E-mail Address	
6	Date of completion (dd/mm/yyyy)	

Comments/References/Links

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Section B: General Newborn Data

	Questions	Answer	
7	What is the scope of the data reported in this section?	National level Regional level Institutional level	**1** ☐ **2** ☐ **3** ☐
8	Please state the year this data was collected (yyyy)		
9	What was the total (or estimated) number of live births?	Not known = **1**	
10	What was the number of newborns with LGA?	Not known = **1**	
11	What was the number of newborns with SGA?	Not known = **1**	
12	Name and surname of additional person(s) providing information for this section, if any		
13	Data source (name of department or institution providing data)		

Comments/References/Links

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Section C: GDM/DMP Policies & Guidelines

	Questions	Answer	
14	Is there a national policy to screen pregnant women for hyperglycemia (DMG/DMP)? If your response is 1-4, please send a copy of the policy together with this form or enter a link below if the policy can be found in a website	Yes, at first antenatal visit only Yes, at 24-28 weeks only Yes, at the first antenatal visit and at 24-28 weeks Yes, not specified None Not known	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6** ☐
15	Is there a guideline for DMG/DMP in place? If **none** or **not known**, continue to Section D. If your response is 1, 2 or 3, please send a copy of the guidelines together with this form or enter a link below if the guidelines can be found in a website	For screening & diagnosis only For management only For screening, diagnosis & management None Not known	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐
16	What is the scope of the guideline?	National level Regional level (state, municipality) Institutional level All None Not known	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6** ☐
17	Is any form of prescreening used?	Yes, OGTT only Yes, fasting blood glucose only Yes, risk factors only Yes, a combination of risk factors and fasting blood glucose or OGTT None Not known Other	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6** ☐ **7** ☐
18	If you responded **other** in the previous question, please specify.		
19	How many steps are used for the diagnosis?	One Two Three Not known	**1** ☐ **2** ☐ **3** ☐ **4** ☐
20	What is the fasting glucose cut-off point for diagnosing Gestational Diabetes? Write 999 if not used		mg/dl mm l
21	What is the glucose load used for OGTT for **final diagnosis** of Gestational Diabetes? Write 999 if not used, if more than one please report the one used in the last step		gms
22 A	What is the diagnostic 1 hour value of the OGTT for diagnosing Gestational Diabetes?		mg/dl
22 B	Write 999 if not used		mm l

23 A	What is the diagnostic 2 hour value of the OGTT for diagnosing Gestational Diabetes?		mg/dl
23 B	Write 999 if not used		mm l
24 A	What is the diagnostic 3 hour value of the OGTT for diagnosing Gestational Diabetes?		mg/dl
24B	Write 999 if not used		mm l
25	Where is the screening and diagnosis for hyperglycemia during pregnancy done?	First level of care Second level clinic or hospital Specialized service Unspecified None Not known	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6** ☐
26	What year were the current guidelines produced or updated? (yyyy)		
27	Name and surname of other person(s) providing information for this section, if any		
28	Data source (name of department or institution providing data)		

Comments/References/Links

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Section D: Type 2 Diabetes & GDM/DMP Prevention/Education Programs

	Questions	Answer	
29	Is there a prevention program for type 2 diabetes?	National level (all levels) Regional level Institutional level None Not known	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐
30	Is there a prevention program specifically for GDM?	National level (all levels) Regional level Institutional level None Not known	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐
31	Is there an educational program for type 2 diabetes?	National level (all levels) Regional level Institutional level None Not known	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐
32	Is there an educational program specifically for GDM?	National level (all levels) Regional level Institutional level None Not known	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐
33	Name and surname of other person(s) providing information for this section, if any		
34	Data source (name of department or institution providing data)		

Comments/References/Links

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Section E: GDM/DMP Data (latest available year)

	Questions	Answer
35	What is the scope of the data reported in this section?	National level **1** ☐ Regional (state, department, province, municipality, etc.) level **2** ☐ Institutional level **3** ☐ Other **4** ☐
36	If you responded **other** in the previous question, please specify	Not known = **1**
37	Please state the year this data was collected (yyyy)	Not known = **1**
38	What was the total number of women diagnosed with GDM/DMP during the reported year?	Not known = **1**
39	How many of them were diagnosed with GDM?	Not known = **1**
40	What was the number of women with diabetes that became pregnant?	Not known = **1**
41	What was the number of overweight/obese women diagnosed with GDM/DMP?	Not known = **1**
42	Number of newborns with macrosomia (> 4kg)	Not known = **1**
43	Number of newborns that were large for gestational age (LGA)	Not known = **1**
44	Number of newborns that were small for gestational age (SGA)	Not known = **1**
45	Number of perinatal deaths (late fetal, ≥28 weeks + early neonatal, <7days)	Not known = **1**
46	Number of newborns delivered by caesarean	Not known = **1**
47	Number of newborns delivered by elective caesarean	Not known = **1**
48	Number of neonatal hypoglycemia	Not known = **1**
49	Number of neonatal intensive care unit (NICU) admissions	Not known = **1**
50	Number of shoulder dystocia	Not known = **1**
51	Number of respiratory distress syndrome	Not known = **1**
52	Number of congenital abnormalities	Not known = **1**
53	Number of women diagnosed with eclampsia	Not known = **1**
54	Number of women diagnosed with pre-eclampsia	Not known = **1**
55	Number of pre-term deliveries	Not known = **1**
56	Number of post-partum hemorrhage	Not known = **1**
57	Number of maternal sepsis	Not known = **1**

58	What was the number of women with GDM / DMP that received only counseling on diet and exercise?	Not known = **1**	
59	What was the number of women with GDM / DMP that received oral hypoglycaemic agents (OHA)?	Not known = **1**	
60	What was the number of women with GDM/ DMP that received Insulin?	Not known = **1**	
61	What was the number of women with GDM / DMP that received both insulin and OHA?	Not known = **1**	
62	Where are women with GDM/ DMP receiving treatment?	First level of care Second level clinic or hospital Specialized service Unspecified Unknown Other	**1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6** ☐
63	If you responded other in the previous question, please specify		
64	Name and surname of **other** person(s) providing information for this section, if any		
65	Data source (name of department or institution providing data)		

Comments/References/Links

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Section F: Post-pregnancy Data

	Questions	Answer	
66	What is the scope of the data reported in this section?	National level Regional level (state, municipality…) Institutional level Other	**1** ☐ **2** ☐ **3** ☐ **4** ☐
67	If you responded other in the previous question, please specify		
68	Please state the year this data was collected (yyyy)		
69	What was the proportion of women with GDM/DMP that received a postpartum re-assessment of their glucose status?	Not known = **1**	
70	What was the proportion of women diagnosed with diabetes after 6-12 weeks postpartum?	Not known = **1**	
71	Is there a program in place to prevent type 2 diabetes for women that presented GDM?	No Yes Not known	**1** ☐ **2** ☐ **3** ☐
72	Name and surname of other person(s) providing information for this section, if any		
73	Data source (name of department or institution providing data)		

Comments/References/Links

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Section G: Comments

Thank you for answering this questionnaire. Your contribution is greatly appreciated. The information provided on this form will be used to produce a report on the status of GDM/DMP in the Region of the Americas. Through the review of this information needs for technical cooperation will be identified. At the same time we hope to identify best practices that deserve to be disseminated during the conference and in future related documents.

Please include comments relevant to the data provided

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End of Data Collection Form


SOL DE ORO


SOL DE ORO


2015
LIMA
PERU

Annex 2.

Meeting program and list of participants

sept | 8 | 2015

07:00 **Group Exercise** (optional).
07:30 Lounge "Sol de Oro" 12th Floor
José Raul Ruiz, Puerto Rico

Session one: Screening & Diagnosis of Diabetes in Pregnancy
Lounge "Empresarial " 2nd floor
Moderator: *Maria Cristina Escobar,* Chile

08:00 **Opening.**
08:30 *Aníbal Velásquez Valdivia,* Minister of Health of Peru
Raul Gonzalez Montero, PAHO-WHO Representative to Peru
Anders Dejgaard, World Diabetes Foundation
Angelica Valdivia, Asociación de Diabetes de Perú
Helard Manrique, Sociedad Peruana de Endocrinología

08:30 **Video. Conference Introduction.**
09:00 **The status of DM, GDM, and the burden of diabetes in Latin America & the Caribbean**
Alberto Barceló, PAHO/WHO, Washington DC

09:00 **WHO Guidelines for the Diagnosis of Diabetes First Detected in Pregnancy.**
09:20 **The Evidence after the 2013 WHO Expert Consultation.**
Gojka Roglic, WHO

09:20 **Roundtable: Screening & Diagnosis of diabetes in pregnancy**
10:00 **Screening & Diagnosis, the risk for mothers and new-borns,**
Sara Meltzer, McGill University, Canada
Screening & Diagnosis Guidelines,
Susana Salzberg, Latin American Diabetes Association (ALAD)

10:00 **Questions & Answers**
10:15

10:15 **Exercise, Diabetes and Pregnancy.**
10:45 *Jose Raul Ruiz,* Puerto Rico
Jose Roberto da Silva, PAHO/WHO Washington DC

10:45 **Coffee Break**
11:00

11:00 **Association between Maternal Health and NCDs.**

11:20 **The FIGO Initiative for GDM**
Luis Cabero, International Federation of Gynaecology and Obstetrics/ Latin American Federation of Obstetrics and Gynecology Societies (FIGO/FLASOG)

11:20 **Country Showcase:**

12:05
- Chile: *Dra. Andrea Srur*, Ministry of Health
- Peru: *Segundo Seclen*, Institute of Endocrinology, Diabetes and Obesity
- Mexico: *Ricardo Juan García Cavazos*, Secretary of Health, Mexico

12:05 **Questions & Answers**

12:20

12:20 **Lunch**

13:20 (Lounge "Ejecutivo III" 1st Floor)

13:20 **The World Diabetes Foundation Projects**

13:50 Mexico: *Socorro Parra*, National Institute of Public Health, Mexico
Colombia: *Humberto Mendoza*, Ministry of Health of Barranquilla

13:50 **Questions & Answers**

14:00

14:00 **Round Table: Improving the Prevention and Control of GDM**

15:00 **Situation Analysis,**
José A Escamilla, PAHO
Adaptation of guidelines,
Ludovic Reveiz, PAHO
Preparing policy briefs,
Evelina Chapman, PAHO
Developing educational capacity,
Enrique Reyes, PAHO/Mexico

15:00 **Working Groups. What are the necessary steps for preparing a roadmap?**

16:20
- Situation analysis of detection and management of GDM
- Adapting and implementing GDM guidelines
- Preparing policy briefs
- Developing educational capacity

16:20 **Coffee Break**

16:30

16:30 **Presentation of selected results**

17:20

17:20 **Review of Day 1.**

17:30 *Maria Cristina Escobar*

17:30 **End of scientific program of day one**

Sept | 9 | 2015

Session two: The Management of Diabetes during Pregnancy
Lounge "Empresarial" 2nd floor
Moderator: *Noël C. Barengo,* Colombia

07:00 **Group Exercise** (optional)
07:30 Lounge "Sol de Oro" 12th Floor
Jose Raul Ruiz, Puerto Rico

08:30 **Introduction of Day 2** (Video Presentation)
09:00 *Alberto Barceló,* PAHO/WHO

09:00 **Maternal diabetes and fetal programming**
09:45 *Michael Ross & Mina Desai,* UCLA

09:45 **Roundtable: The Management of Diabetes & Hyperglycemia during Pregnancy**
10:30 *Angelica Valdivia,* Peru
Aleida Rivas, Venezuela

10:30 **Questions & Answers**
10:45

10:45 **Active Pause.**
11:00 *Jose Raul Ruiz,* Puerto Rico

11:00 **Coffee Break**
11:15

11:15 **Country Showcase**
12:00
- Brazil: *Dr. Beatriz Martins da Costa Maciel*, Ministry of Health
- Colombia: *Javier Maldonado,* Ministry of Health
- Cuba: *Jacinto Lang,* National Institute of Endocrinology

12:00 **Questions & Answers**
12:15

12:15 **Lunch**
13:15 (Lounge "Ejecutivo III" 1st Floor)

13:15 **The connection between maternal care and NCDs, including GDM**
13:30 *Suzanne Serruya,* CLAP/PAHO

13:30 **Group Discussion:**
16:00 **Sub Regional Perspective – Improving the prevention and control of diabetes during pregnancy**
Suggested questions for working groups:

1. In your opinion, what are the barriers for improving prevention, screening and management of diabetes related to pregnancy?
2. Identify activities and actors for a plan to overcome barriers for the control of diabetes related to pregnancy?
3. What are the next steps to be taken in your country/ sub region to improve control of gestational diabetes

Groups:

a) English Speaking Caribbean (Facilitator Tomo Kanda)
b) Spanish Caribbean (Facilitator Vivian Perez)
c) Mexico & Central America (Facilitator Kam Suan Mung)
d) Andean Region (Facilitator Gladys Bernal)
e) Southern Cone (Facilitators Lenildo Moura, Adriano Bueno Tavares)

16:00 – 16:15 **Coffee Break**

16:15 – 17:15 **Working Groups Continue**

17:15 – 17:30 **Review of Day Two**.
Noël Barengo

17:30 **End of scientific program of day two**

Sept | 10 | 2015

Session three: Post-partum Follow-up and Prevention
Lounge "Empresarial" 2nd floor
Moderator: *Karen Roberts,* Guyana

07:00 – 07:30 **Group Exercise** (optional).
Lounge "Sol de Oro" 12th Floor.
Jose Raul Ruiz, Puerto Rico

08:30 – 08:50 **Testimony: Interview with Lurline Less (Jamaica)**
by Noël C Barengo

08:50 – 09:10 **The Cost Effectiveness of Screening for GDM**
Noël Barengo, PAHO/WHO

09:10 – 09:25 **Questions & Answers**

09:20 – 10:45 **Roundtable: Post-partum Follow-up and Prevention**
Hector Bolatti, Argentina
Silvia Lapertosa, Argentina
Aleida Rivas, Venezuela

10:45 – 11:05 **Questions & Answers**

11:05 **Active Pause.**
11:20 *Jose Raul Ruiz,* Puerto Rico

11:20 **Coffee Break**
11:40

11:40 **The Diabetes Program of Peru.**
12:00 *Eloisa Nuñez,* Ministry of Health of Peru

12:00 **From theory to practice: national/sub regional commitments**
13:00 Presentations by country groups

13:00 **Conference Summary and Conclusion**
13:20 *Alberto Barceló,* PAHO/WHO

13:20 **Closing remarks**
13:30 *Juan Daniel Aspilcueta Gho,* Ministry of Health of Peru

13:30 **Conference adjourn**

13:30 **Lunch**
(Lounge "Ejecutivo III" 1st Floor)

Participants

ANTIGUA & BARBUDA
1. **Gretcene Avonella Quallis**

ARGENTINA
1. **Héctor Bolatti**
   Federación Latinoamericana de Sociedades de Obstetricia y Ginecología
2. **Ingrid Di Marco**
   Ministry of Health
3. **Silvia Lapertosa**
   International Diabetes Federation Central-South America
4. **Susana Salzberg**
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