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Best Practices for the Design, Implementation and Evaluation of Prenatal Health Programs

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Abstract
Introduction Prenatal health programs provide health education, reproductive care and related services to women. Programs may be administered individually or collaboratively by agencies including public health units, hospitals, health clinics, community and non-governmental organizations. Prenatal health disparities among populations at-risk may be reduced through the provision of accessible health education, services and resources to help women mitigate modifiable risks to pregnancy. Although standardized guidelines inform clinical screening, testing and maternity care, gaps exist regarding the design, implementation and evaluation for comprehensive prenatal health programs. *Methods* Using a multijurisdictional approach, prenatal health guidance documents released by clinical associations and regional governments across Canada, Australia, the United States, the United Kingdom and Ireland were systematically evaluated to identify standards and practices regarding the design, implementation and evaluation of prenatal health programs. *Results* Evidence-based, surveillance/monitoring, and expert/stakeholder collaborations were principles affirmed by guidance documents across all jurisdictions. Each jurisdiction described tailored strategies to optimize prenatal health in their respective communities. Divergence between jurisdictions was noted for patient care models and promotion of providers and companions of choice. *Discussion* A best practices model is proposed describing recommendations as follows: prenatal health programs should be grounded in a theoretical approach, fundamentally woman-centered and designed to address interacting prenatal health determinants across the lifespan. Accessible and inclusive prenatal health care can be achieved through provider training and community stakeholder collaborations. Identification of best practices for prenatal health program design, implementation and evaluation ensures that service standards are harmonized across communities, thereby optimizing maternal and child health.

Keywords Pregnancy · Health promotion · Prenatal care · Prenatal health · Woman-centered care

Significance

What is already known about this subject? Recognizing that pregnancy is a complex social and biological transition in a woman's life, prenatal health programs must go beyond clinical services to address the interacting determinants of health throughout a woman's lifespan. Optimization of maternal-child health outcomes requires prenatal health programs to address the needs of women marginalized by race/ethnicity, citizenship, geography, disability, language and sexual identity. *What this study adds?* Emerging from our multijurisdictional review of prenatal guidance documents, we propose a model describing fundamental best practices for the design, implementation and evaluation of inclusive, accessible and woman-centered prenatal health programs.

Introduction

Prenatal interventions encompass education, health services and outreach programs designed to help women optimize pregnancy outcomes. Prenatal health promotion requires the empowerment and meaningful participation of women throughout their reproductive lives (World Health Organization (WHO) 1986). Women marginalized by socioeconomic status (SES), citizenship, race/ethnicity, age and sexual

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identity under-utilize prenatal health services, including prenatal education, and consequently experience disparities in maternal and child health outcomes (Feijen-De Jong et al. 2012; Johnson et al. 2006; Novick 2009).

Prenatal health programs encompass traditional prenatal healthcare providers, clinical services, community and public health programs. Quality prenatal services require that structural, interpersonal and clinical aspects of care address needs of all women (Sword et al. 2012). WHO (2015) recommends maternal and newborn health interventions (Box 1) for both developing and high-income countries. However, the extent to which these recommendations have been incorporated in prenatal health programs is not well documented. Countries with technologically-advanced maternal healthcare often differentiate clinical services delivery from sexual and reproductive health (SRH) promotion (Johnson et al. 2006). For many urban centers in the United States (US) (Johnson et al. 2006) and Canada (Muhajarine et al. 2012), public health agencies are mandated to provide broad health promotion programming including prenatal education. These community-based, public-health organizations may require standardized criteria for the design and implementation of prenatal health interventions. Multijurisdictional evaluations of prenatal health programs enable identification of best practices and fundamental principles of prenatal care. Only a few multijurisdictional comparisons are published evaluating prenatal care in North America, Europe and Australia (Bernloehr et al. 2005; Haertsch et al. 1999; Langer et al. 1999), with an emphasis on clinical testing practices. As pregnancy is a complex social and biological transition in a woman's life, a broad, interdisciplinary approach is essential to produce integrated clinical and social prenatal care. The value of a multijurisdictional review of prenatal health practices, guidelines and principles would greatly enhance harmonization of services across regions, thereby optimizing maternal and child health outcomes.

Box 1 World Health Organization recommendations on health promotion interventions for maternal and newborn health. Reproduced with permission from WHO (2015)

Recommendations
Birth preparedness and complication readiness
Male involvement interventions for maternal and newborn health
Partnership with traditional birth attendants
Providing culturally appropriate skilled maternity care
Companion of choice at birth
Community mobilization through facilitated participatory learning and action cycles with women's groups
Community participation in quality-improvement processes
Community participation in programme planning and implementation
Conditional recommendations
Maternity waiting homes
Community-organized transport schemes
Research recommendations
Interventions to promote awareness of human, sexual and reproductive rights and the right to access quality skilled care
Community participation in maternal death surveillance and response

The purpose of our study is to evaluate prenatal and maternity care guidelines, policy documents and frameworks developed by professional clinical associations and regional governments from Canada, the US, Australia, the UK and Ireland, to identify best practices for the design, implementation and evaluation of prenatal health programs.

Methodology

Sample

A multijurisdictional approach was used to identify prenatal and maternity care guidance documents released between 2000 and 2017 by clinical associations and regional governments across Canada, US, Australia, UK and Ireland. The sample of guidance documents included frameworks and strategies outlining the design, implementation and evaluation of national and regional prenatal health services, in addition to clinical practice guidelines. Documents which described prenatal program outcomes and population needs assessments were excluded from our evaluation. All guidance documents were publicly available and intended for use by health care professionals and program administrators. This study did not require ethical approval as the material evaluated is not based on clinical or patient data. Inclusion of prenatal guidance documents for evaluation was purposive to ensure both geographic representation and demographic diversity, particularly for Canada and US (Tables 1, 2, 3, 4). *Canada*: One federal and eight provincial/territorial government prenatal frameworks representing distinct geographic regions of Canada were selected in accordance with the sample selection criteria. *US*: Ten state government prenatal reports, one from each U.S. Department of Health and Human Services region, and four national prenatal guidelines were included in the US sample. The Title V Maternal and Child Health Services Block Grant Program provides federal government funding to each state to support the development and implementation of maternal and child health services and requires standardized reporting criteria and applications for funding. For each of the ten states included in the sample, their most recent Title V Maternal and Child Health report and proposal were evaluated. *Australia*: Although similarly comprised of regional territorial governments, in 2010 Australia's health ministers agreed to a National Maternity Service Plan, subsuming regional maternity care under federal guidelines (Australian Government Department of Health 2015). The Australian prenatal

Table 1 Canadian prenatal health guidance documents

Federal Jurisdiction

Government of Canada, Health Canada: *Family-Centred Maternity and Newborn Care: National Guidelines, 2000*

Provincial/Territorial Jurisdictions

Government of British Columbia, Perinatal Services BC: *Perinatal Services BC, Provincial Perinatal Guidelines, Population and Public Health Prenatal Care Pathway, 2014*

Government of Manitoba, Manitoba's Regional Health Authorities and Manitoba Health, Healthy Living and Seniors: *Provincial Public Health Nursing Standards: Prenatal, Postpartum, and Early Childhood, 2015*

Government of Newfoundland and Labrador, Department of Health and Community Services: *Education and Support Standards for Pregnancy, Birth and Early Parenting, 2005*

Government of Nova Scotia, Public Health Services, Health Promotion and Protection: *Prenatal Education & Supports Standards for Public Health Services, 2005*

Government of Nunavut, Department of Health and Social Services: *Nunavut Maternal and Newborn Health Care Strategy 2009–2014*

Government of Ontario, Child and Youth Development Branch, Strategic Policy and Planning Division, Ministry of Children and Youth Services: *Healthy Babies Healthy Children Guidance Document, 2012*

Government of Ontario, Standards, Programs & Community Development Branch, Ministry of Health Promotion: *Reproductive Health, Guidance Document, 2010*

Le Gouvernement du Québec, Santé et Services Sociaux: *La Politique* de *périnatalité 2008–2018, un projet porteur de vie, 2008*

Clinical Associations

Association of Women's Health, Obstetric, and Neonatal Nurses: *Standards for Perinatal Nursing Practice and Certification in Canada*, *2nd Edition, 2009*

Canadian Association of Perinatal and Women's Health Nurses: *CAPWHN Position Statement on Cultural Safety/Humility, 2017, Retrieved from*: http://www.capwhn.ca/en/capwhn/About_CAPWHN_p3185.html

The Society of Obstetricians and Gynaecologists of *Canada*
Alcohol Use and Pregnancy Consensus Clinical Guidelines, 2010
Canadian Consensus on Female Nutrition: Adolescence, Reproduction, Menopause, and Beyond, 2016
Management of Spontaneous Labour at Term in Healthy Women, 2016
Obesity in Pregnancy, 2010
Rural Maternity Care, 2012
Substance Use in Pregnancy, 2011
The Roles of Multidisciplinary Team Members in the Care of Pregnant Women, 2016

health guidance documents reviewed represent the federal-level jurisdiction. *UK–Ireland*: National prenatal frameworks from England, Scotland and Ireland comprised the sample. *Clinical Associations*: Prenatal guidelines produced by clinical health associations were selected to ensure representation of the major regions in this study (Canada, US, Australia, UK, Europe). Obstetrics and gynecology associations were emphasized, with the inclusion of nursing association documents from the US and Canada.

Evaluation Methodology

Elements of prenatal program design, implementation, evaluation and population reach were adopted from WHO principles and recommendations (Chalmers et al. 2001; WHO 2015) and relevant literature (Atrash et al. 2006; Glanz and Bishop 2010; Johnson et al. 2006). Prenatal guidance documents were evaluated May–July 2017 separately by two researchers (RC, KP) to determine if these structured criteria (Box 2) were represented as essential components. Scoring discrepancies were discussed in team meetings to reach consensus. Prenatal program criteria (Box 2) were scored using a scale of 0 or 1: 0—practice not mentioned, 1—practice addressed. As the intention of the evaluation was to identify best practices across jurisdictions, average scores are reported here for clinical associations and for each country included in our analysis. Average scores per jurisdiction are presented here as 0 (practice not addressed), 1–24% (infrequently addressed), 25–49% (poorly addressed), 50–74% (moderately addressed) and 75–100% (frequently addressed—representing a 'best practice').

Box 2 Evaluation criteria for prenatal health programs (from Atrash et al. 2006; Chalmers et al. 2001; Glanz and Bishop 2010; Johnson et al. 2006; WHO 2015)

Program design
Evidence-based
Theoretical foundation
Expert collaborations
Stakeholder collaborations

Program implementation, evaluation
Surveillance/monitoring
Healthcare provider training
Community capacity building

Population reach
Accessibility
Inclusivity
Prenatal health promotion (*e.g. education, communication strategies*)
Strategies for partner/father
Models of care
Woman-centered care
Family-centered care
Prenatal provider of choice
Companion of choice (*e.g. partner, husband, family-member, friend*)
Sexual and reproductive health rights approach

Results

Program Design

All prenatal guidance documents affirmed childbirth as a natural process and prioritized patient care and safety. Guidance documents from all jurisdictions used an evidence-based approach and incorporated clinical professionals in program design (Table 5). Non-health sector stakeholder involvement generally occurred after initial program design. Almost all guidelines included a theoretical perspective, however many guidelines did not explicitly state that theory provided the foundation for the interventions proposed. A population health approach (Public Health Agency of Canada (PHAC) 2013) was explicitly referenced in Canadian guidelines, while implicitly acknowledged as social determinants of health by other jurisdictions. The US Title V Grant program formally endorses the life course theory (Lu 2010) and as such all US guidelines used this theoretical foundation.

Program Implementation, Evaluation

All jurisdictions described the importance of surveillance and monitoring practices to ensure patient safety and effective implementation of the proposed interventions (Table 6). Surveillance and monitoring included community needs assessments, maternal health indicator data collection and

Table 2 US prenatal health guidance documents

Federal/National Agencies
Association of Maternal & Child Health Programs (AMCHP): *Health for Every Mother, A Maternal Health Resource and Planning Guide for States, 2015*
Centers for Disease Control and Prevention: *Recommendations to Improve Preconception Health and Health Care—United States. A Report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care MMWR 55(RR06);1–23, 2006*
Centers for Disease Control and Prevention's Division of Reproductive Health: *Developing and Sustaining Perinatal Quality Collaboratives. A Resource Guide for States, 2016*
March of Dimes: *Toward Improving the Outcome of Pregnancy III, Enhancing Perinatal Health Through Quality, Safety and Performance Initiatives, 2010*
State Jurisdictions
California-Health and Human Services Agency, California Department of Public Health: *Maternal and Child Health Services Title V Block Grant, California, 2017 Application, 2015 Annual Report, 2016*
Colorado Department of Public Health and Environment: *Maternal and Child Health Services Title V Block Grant, Colorado, 2017 Application, 2015 Annual Report, 2016*
Florida Health: *Maternal and Child Health Services Title V Block Grant, Florida, 2017 Application, 2015 Annual Report, 2016*
Iowa Department of Public Health, Promoting and Protecting the Health of Iowans: *Maternal and Child Health Services Title V Block Grant, Iowa, 2017 Application, 2015 Annual Report, 2016*
Michigan Department of Health and Human Services: *Maternal and Child Health Services Title V Block Grant, Michigan, 2017 Application, 2015 Annual Report, 2016*
New York State, Department of Health: *Maternal and Child Health Services Title V Block Grant, New York, 2017 Application, 2015 Annual Report, 2016*
Oregon Health Authority, Public Health Division, Center for Prevention and Health Promotion: *Maternal and Child Health Services Title V Block Grant, Oregon, 2015*
Pennsylvania Department of Health: *Maternal and Child Health Services Title V Block Grant, Pennsylvania, 2015*
Texas Department of State Health Services: *Maternal and Child Health Services Title V Block Grant, Texas, 2017 Application, 2015 Annual Report, 2016*
Vermont Department of Health, Division of Maternal and Child Health: *Maternal and Child Health Services Title V Block Grant, Vermont, 2017 Application, 2015 Annual Report, 2016*
Clinical Associations
American Academy of Pediatrics, The American College of Obstetricians and Gynecologists: *Guidelines for Perinatal Care, 7th Edition, 2012*
(US) Association of Women's Health, Obstetric and Neonatal Nurses: *Perinatal Nursing, 4th Edition, 2014*

Table 3 Australian prenatal health guidance documents

Australian Government, Department of Health: *Clinical Practice Guidelines, Antenatal Care—Module I, 2012* *Clinical Practice Guidelines, Antenatal Care—Module II, 2014*
National Health Workforce Taskforce and the Maternity Services Inter-Jurisdictional Committee: *Core Competencies and Educational Framework for Maternity Services in Australia Final Report, 2010*
Standing Council on Health and Community and Disability Services: *National Maternity Services Capability Framework, 2012*
Clinical Associations
The Royal *Australian* and *New Zealand* College of Obstetricians and Gynaecologists: *Standards of Maternity Care in Australia and New Zealand, 2016*

Table 4 UK–Ireland prenatal health guidance documents

Healthy Ireland, Department of Health, Patient Safety First: Creating a Better Future Together, National Maternity Strategy 2016–2026
NHS England: National Maternity Review: *Better Births, improving outcomes of maternity services in England, A 5 Year Forward View for maternity care*, *2016*
The Scottish Government: *The Best Start, A 5-year Forward Plan for Maternity and Neonatal Care in Scotland, 2017*
The Scottish Government, Healthier Scotland: *A Refreshed Framework for Maternity Care in Scotland, The Maternity Services Action Group, 2011*
Clinical Associations
European Board and College of Obstetrics and Gynaecology: *Standards of Care for Women's Health in Europe, Obstetrics and Neonatal Services, 2014*
(UK) Royal College of Obstetricians and Gynaecologists: *Providing Quality Care for Women, A Framework for Maternity Service Standards, 2016*

Table 5 Multijurisdictional practices for prenatal health program design

Jurisdiction	Evaluation criteria[a]			
	Evidence-based	Theoretical foundation	Expert collaborations	Stakeholder collaborations
Canada (N = 9)	++++	++++	++++	++++
US (N = 14)	++++	++++	++++	++++
Australia (N = 3)	++++	++++	++++	++++
UK–Ireland (N = 4)	++++	++++	++++	++++
Clinical Associations (N = 8)	++++	++++	++++	++++

[a]Prenatal guidance documents from each jurisdiction were evaluated using the criteria described in Box 2. Each parameter was scored using a scale of 0 or 1: 0—practice not mentioned, 1—practice addressed. Average percentage scores per jurisdiction are represented as "–" (0%), "+" (0–24%), "++" (25–49%), "+++" (50–74%) and "++++" (75–100%)

quality of care assessments. Ongoing prenatal provider training, including clinical skills and techniques, cultural competency and specialized care delivery (e.g. mental health and disability services), was expressed by all jurisdictions. US frameworks notably placed emphasis on increasing provider knowledge on preconception health and family planning.

Community prenatal health capacity-building is an essential element, particularly for rural and remote communities, where skilled prenatal care providers may be limited. Canadian, US and UK guidelines addressed the need to train both lay community members and providers, however community capacity-building was largely absent from most clinical association guidelines (Table 6).

Population Reach

The principles of accessible and inclusive prenatal health care were affirmed as fundamental by all prenatal guidance documents (Table 7). Recognized barriers to prenatal care included hours of operation, availability of providers, awareness of services, and direct and indirect costs. Guidance documents also recognized that women who are non-Anglophone, have low literacy or experience mental illness,

Table 6 Multijurisdictional practices for prenatal health program implementation and evaluation

Jurisdiction	Evaluation criteria[a]		
	Surveillance/monitoring	HCP training	Community capacity building
Canada (N = 9)	++++	++++	++++
US (N = 14)	++++	++++	++++
Australia (N = 3)	++++	++++	+++
UK–Ireland (N = 4)	++++	++++	++++
Clinical associations (N = 8)	++++	++++	++

HCP Health care provider

[a]Prenatal guidance documents from each jurisdiction were evaluated using the criteria described in Box 2. Each parameter was scored 0 or 1: 0—practice not mentioned, 1—practice addressed. Average percentage scores per jurisdiction are represented as "–" (0%), "+" (0–24%), "++" (25–49%), "+++" (50–74%) and "++++" (75–100%)

including addiction, may encounter significant barriers to prenatal services, necessitating optimization of service delivery channels. All prenatal guidelines described strategies to target marginalized populations within their specific regions (Table 7). Women at-risk were identified as women living with disabilities, immigrants, refugees, racial/ethnic minorities, Indigenous peoples, travelers/Romani and lesbian, gay, bisexual, transgender, queer (LGBTQ) individuals. Jurisdictions aimed to both reduce health disparities and deliver 'culturally-competent care'. Promoting the prenatal health of Indigenous peoples was emphasized in Canadian and Australian documents through community-collaborations and stakeholder involvement.

Prenatal health promotion, including preconception and prenatal education, multilingual awareness campaigns and prenatal resources, was recognized as an essential component of prenatal care by all jurisdictions. Several guidance documents from Canada and clinical associations acknowledged the importance of partners and fathers in prenatal health promotion, with strategies and interventions tailored to their specific needs; described by select guidelines from UK, Australia and US (Table 7). Prenatal information channels incorporated community stakeholders, multimedia platforms, social media, websites and traditional print messaging. Both Canadian and US documents identified community collaborations to target health promotion to communities at-risk.

Models of Patient Care

All guidance documents recognized the principle of patient-centered care, however the approach varied across jurisdictions. Documents from Australia, England and Ireland explicitly affirmed a woman-centered care model, whereas North America and clinical associations favored a family-centered approach (Table 8). Although many North American documents did not explicitly use the term 'woman-centered', principles such as woman's autonomy and informed decision-making were described as central to patient-care. Few guidelines explicitly promoted the provider of choice principle, wherein the autonomy of women to choose their preferred prenatal care provider is acknowledged as fundamental. Provider choice was only emphasized in documents from Ireland, UK and select guidelines from Canada and clinical associations. US and Canada promoted traditional medical models of maternity care, whereas midwives appeared to be the dominant prenatal care provider in Australia, UK and Ireland.

Another component of a woman-centered approach is the ability of the woman to select her preferred prenatal care and labor support—"companion of choice" (Chalmers et al. 2001). This principle was rarely made explicit in the guidelines reviewed, however several jurisdictions from Canadian and Australian guidelines acknowledged and supported a woman's choice to include a support person throughout prenatal care and childbirth (Table 8). Finally, the WHO recommends the need for continued research into the application of

Table 7 Multijurisdictional practices for prenatal health program population reach

Jurisdiction	Evaluation criteria[a]			
	Accessibility	Inclusivity	Prenatal health promotion	Strategies for father/partner
Canada (N = 9)	++++	++++	++++	++
US (N = 14)	++++	++++	++++	+++
Australia (N = 3)	++++	++++	++++	++
UK–Ireland (N = 4)	++++	++++	++++	++++
Clinical associations (N = 8)	++++	++++	++++	+++

[a]Prenatal guidance documents from each jurisdiction were evaluated using the criteria described in Box 2. Each parameter was scored 0 or 1: 0—practice not mentioned, 1—practice addressed. Average percentage scores per jurisdiction are represented as "–" (0%), "+" (0–24%), "++" (25–49%), "+++" (50–74%) and "++++" (75–100%)

Table 8 Multijurisdictional models of patient care for prenatal health services

Jurisdiction	Evaluation criteria[a]				
	Woman-centered care	Family-centered care	Provider of choice	Companion of choice	SRH rights approach
Canada (N = 9)	+	++++	++	+++	–
US (N = 14)	–	++++	–	+	–
Australia (N = 3)	++++	++	–	+++	–
UK–Ireland (N = 4)	+++	++++	++++	++	–
Clinical associations (N = 8)	++	+++	–	+++	–

SRH Sexual and reproductive health

[a]Prenatal guidance documents from each jurisdiction were evaluated using the criteria described in Box 2. Each parameter was scored 0 or 1: 0—practice not mentioned, 1—practice addressed. Average percentage scores per jurisdiction are represented as "–" (0%), "+" (0–24%), "++" (25–49%), "+++" (50–74%) and "++++" (75–100%)

a SRH rights approach (Box 1) to prenatal care, however this approach was absent from all guidance documents reviewed.

Discussion

Evaluated prenatal guidelines were remarkably consistent in their recommendations for program design, implementation, evaluation and general strategies for population reach. Marked differences in patient care models were apparent, resulting in jurisdictional differences in incorporating the provider of choice and companion of choice principles (Chalmers et al. 2001; WHO 2015). Guidance documents were evidence-based and developed using relevant expert collaborations. Each jurisdiction described tailored strategies to optimize prenatal health for women at-risk in their respective communities. Although most documents were developed prior to the release of the WHO 2015 recommendations, the results from this study are well aligned with the WHO core principles.

Using the findings from our multijurisdictional evaluation of prenatal guidelines, we propose a model for prenatal health program design, implementation and evaluation (Fig. 1), discussed below within the context of our study.

Program Design

The most effective prenatal program planning models are founded on evidence and theory (Glanz and Bishop 2010; Lu 2010; Muhajarine et al. 2012), which enables identification of prenatal risk factors, mechanisms for outreach and strategies for effective interventions. From our review and evaluation of prenatal guidelines, we recommend a mixed-theoretical approach combining population health theory with a life course approach (Fig. 1). Modifiable lifestyle prenatal risk factors interact with biological, social and environmental determinants, as elaborated by the population health theory

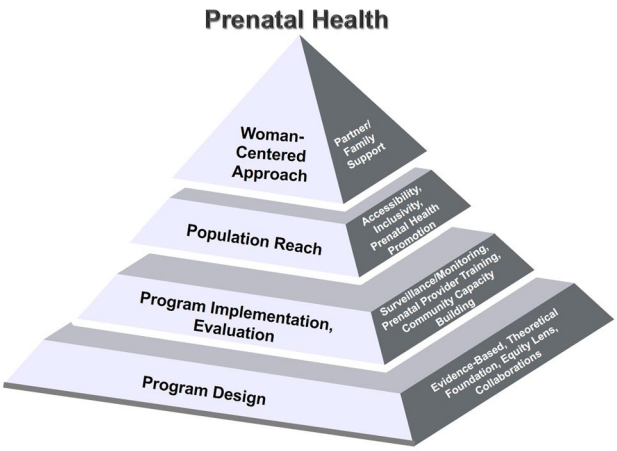

Fig. 1 Proposed model describing the design, implementation and evaluation of prenatal health programs. Emerging from our multijurisdictional review of prenatal guidance documents from Canada, US, Australia, UK, Ireland and related clinical associations, a prenatal program model is proposed to provide health administrators and providers with standard design principles to optimize prenatal health program outcomes. We recommend that prenatal health programs be founded on evidence, theory, equity and collaboration throughout all aspects of program development. Interventions should recognize the interacting determinants of health, described by the population health theory (PHAC 2013) across the life course (Lu 2010). Effective implementation and evaluation require ongoing surveillance/monitoring, prenatal provider training and community capacity building to ensure program sustainability. Programs that are inclusive are likely to be accessible, building on an equity lens and stakeholder partnerships in the foundation of the model. Community collaborations ensure population reach for prenatal health education and risk communication. Finally, prenatal health programs should be fundamentally woman-centered, recognizing women's autonomy, sexual and reproductive health rights and choices of provider and labor support companion(s). Best practices for prenatal health program design, implementation and evaluation ensures that service standards are harmonized across communities, thereby optimizing maternal and child health

(PHAC 2013), and are further influenced by individual, interpersonal and organizational behaviors, as described by the socio-ecological model (McLeroy et al. 1988). Population health theory is well integrated within Canadian approaches, with all other jurisdictions recognizing the social determinants of health in the design of their prenatal health programs. US prenatal programs are founded on the life course model, which posits health as a continuum across an individual's life, influenced by the interplay of social, behavioral, biological, psychological and environmental factors (Lu 2010). As most pregnancies are unplanned, recognition of these social determinants and access to prenatal interventions to reduce related lifestyle risk factors is essential to provide a continuum of care across a woman's reproductive life, optimizing pregnancy outcomes (Handler and Johnson 2016; Misra et al. 2003). Therefore, SRH promotion should be introduced to both men and women at the preconception stage, using an integrated theoretical approach comprised of the population health theory and life course model (Atrash et al. 2006; Johnson et al. 2006; Lu 2010).

Integration of relevant theoretical approaches within clinical practice necessitates the participation of both academic and clinical experts in the initial design of prenatal health programs. Stakeholder collaborations contribute to community engagement, outreach and mobilization and can be essential partners for program delivery (Smylie et al. 2016). Recognizing health disparities of Indigenous peoples in Australia and Canada, regional guidelines have incorporated representative stakeholders throughout prenatal program planning and delivery for relevant communities. Benefits of Canadian maternal-child health programs with sustained Indigenous community participation and leadership include positive birth outcomes, improved access to prenatal and postnatal care and increased rates of breastfeeding (Smylie et al. 2016). US guidance documents described partnerships with Hispanic communities and traditionally Black colleges to ensure targeted dissemination of preconception health promotion. Stakeholder collaborations enhance all phases of prenatal programs- design, implementation and service delivery (Fig. 1).

Program Implementation, Evaluation

Program implementation and evaluation require ongoing surveillance and monitoring to assess patient safety, quality of care and capture program indicator data (Glanz and Bishop 2010). US guidance documents referenced the CDC—PRAMS (Pregnancy Risk Assessment Monitoring System) project, which collects state-level maternal experience indicators throughout pregnancy (Johnson et al. 2006). Australian guidance documents noted the need to standardize patient indicators, establish national benchmarks and obtain maternal morbidity and mortality data. British guidelines suggest collection of clinical team service quality and outcomes data to prompt any necessary changes to protocols or training. Assessments of community needs, program evaluations and surveillance are essential to optimize prenatal interventions (Fig. 1).

Ongoing healthcare provider training ensures patient safety, uptake of new technologies and inclusive and accessible care. All jurisdictions emphasized professional development in areas of smoking cessation, addictions counselling, maternal mental health and cultural competency. WHO implemented maternity provider training courses across Europe in 1999, recognizing psychological pregnancy needs including the companion of choice principle and the need for culturally appropriate care (Chalmers et al. 2001). Gaps in provider knowledge can contribute to inadequate prenatal health promotion, quality of care and stigma of pregnant women with disabilities (Tarasoff 2015). Collaborations with disability, addictions or mental health advocates and community stakeholders may address the specific training needs of health care providers.

Sustainable prenatal health programs require community capacity building (Keller et al. 2004), particularly important for rural/remote populations who typically lack access to health services (Hoang et al. 2014). The prenatal guidance document of a Northern Canadian territory, Nunavut, described midwifery recruitment plans to ensure sustainable reproductive services for rural/remote residents (Government of Nunavut 2009). Stakeholders, auxiliary health providers and social services workers may also require training to ensure culturally competent and evidence-based services (Government of Nunavut 2009; Heaman et al. 2015). The term 'cultural integrity' describes the transmission of Indigenous cultural knowledge and practices which in turn, translates to uptake of prenatal health promotion by the community (Smylie et al. 2016). Maternity providers working in diverse settings, including rural/remote locations, experience many benefits such as collaborative practice models of care, local community support and development of 'generalist' maternity care skills (Miller et al. 2012). Thus, prenatal health community capacity building benefits practitioners, patients and local communities (Fig. 1).

Enhancing Population Reach

Effective prenatal programs require both uptake of health promotion messaging and active participation of women in relevant interventions including prenatal classes. As discussed, community engagement and collaborative leadership opportunities increase protective prenatal behaviors among local women (Smylie et al. 2016). Barriers to prenatal class attendance and prenatal services include perceptions of stigma and social exclusion, lack of specific interventions to address needs of women with disabilities, in addition to

structural barriers such as finances, time constraints and the requirement of travel to access services (Heaman et al. 2015; Tarasoff 2015; Vonderheid et al. 2007). Even within jurisdictions with universal health care, social disadvantages may contribute to inequities in prenatal care quality and access (Sutherland et al. 2012). Inclusivity and accessibility are interrelated principles of good prenatal program practice, as programs designed to be inclusive of all women, are apt to be accessible. Although tailored prenatal interventions are essential to target women at-risk, prenatal health education is most successful when a wide range of both risk and protective behaviors are discussed (Vonderheid et al. 2007). Prenatal health promotion becomes a by-product of community participation and capacity building, wherein all members of the community work towards raising awareness about preconception and pregnancy education, including education in schools and community centers, as described by some US guidance documents. Use of an equity lens provides the impetus for prenatal interventions to explore community partnerships, new channels for service delivery, including online, and the development of cultural competency among providers, thereby ensuring population program reach (Fig. 1).

Models of Prenatal Care

Most North American prenatal guidance documents evaluated here promoted a family-centered model of patient care, often combined with a woman-centered approach (Table 8). Although several documents appeared to describe components of a woman-centered approach, appropriate implementation requires programs, providers and interventions to explicitly assert a woman-centered model of care. As described in our model (Fig. 1), we recommend a woman-centered approach which recognizes and supports families and partners. Woman-centered care is tailored to a woman's individual needs and expectations through holistic approaches that recognize the cultural, spiritual and psychological aspects of health (Fahy 2012). A woman-centered approach is also congruent with SRH rights (Fahy 2012; United Nations 1996) and recommended by the WHO (2015). As not all families or partners are supportive, and indeed, may contribute to sexual/reproductive coercion, social control or intimate partner violence (Shah and Shah 2011), a woman's autonomy, decision-making and choices must remain central for prenatal health programs. A woman-centered approach recognizes a woman's need to identify her provider of choice and her companion(s) of choice, who will support her during pregnancy, labor and delivery (Fahy 2012; Price et al. 2007). In North America, physicians, obstetricians and gynecologists are typical prenatal providers, whereas in UK and Australia, midwifery practice models are more common. Developing interprofessional collaborations and recognizing the strengths of different provider models and labor support professionals, facilitates accessible and inclusive care through individualized, holistic, culturally-appropriate and evidence-based services (Fahy 2012; Heaman et al. 2015).

Women must be able to choose companions for prenatal support and labor and might also identify partners or co-parents who may themselves require prenatal education and support. Preferred companions during prenatal care and labor and delivery may be identified as the biological father, male or female partner, doula, friend or relative (Chalmers et al. 2001; Price et al. 2007). Providers must understand that for certain cultures, men's involvement during labor and delivery is not traditional or perceived as appropriate, requiring healthcare providers to refrain from assumptions regarding the father's apparent interest in the woman and baby (Chalmers et al. 2001; Price et al. 2007). Strategies for partner prenatal education and support must first recognize that some women may be single, partnered with someone other than the biological father of the baby or in a non-heterosexual relationship. Building on the life course perspective, promoting prenatal health includes strategies that target partner health throughout their lifespan (Lu 2010). Preconception health strategies for biological fathers may differ from emphasis on lifestyle behaviors for cohabiting partners of both sexes, including smoking cessation, intimate partner violence prevention and stress management (Shah and Shah 2011; Vonderheid et al. 2007). An inclusive, woman-centered model of care that provides support for family and partners identified by the woman, best reflects the complex social relationships in her life and ensures that her autonomy remains central.

Limitations

We recognize that our review of prenatal guidance documents may be limited by several factors. First, many of the prenatal guidelines evaluated were released prior to the WHO 2015 recommendations (Box 1), although these principles were available in other forms of publications, conferences and reports (Chalmers et al. 2001). Second, we recognize that other resources and guidelines are available within each jurisdiction, with program administrators and providers able to assess and harmonize all available literature prior to planning and implementing prenatal services. Third, we did not assess the uptake of these prenatal guidelines within each jurisdiction and thus cannot comment on their translation to clinical practice. Finally, we acknowledge that our multijurisdictional evaluation was limited to technologically-advanced, Anglophone, Western countries. Although our sampling should provide a comprehensive portrait of maternity care in the regions evaluated, we cannot extrapolate our findings to other jurisdictions.

Conclusion

In conclusion, the design, implementation and evaluation of prenatal health programs should be established using an evidence-based, theoretical and collaborative foundation. Recognizing the diverse influences on maternal health, clinical prenatal care providers should partner with public health and community agencies to address the interactions of biological, environmental and psychosocial determinants on pregnancy. Enhancing population reach requires training prenatal professionals to provide inclusive and accessible care that responds to the needs of communities marginalized by race/ethnicity, citizenship, geography, SES, disability and sexual identity. A woman-centered approach, recognizing her autonomy, SRH rights and need for continuity of clinical care and social support, is central to optimizing her experiences with prenatal programs.

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References

Atrash, H. K., Johnson, K., Adams, M., Cordero, J. F., & Howse, J. (2006). Preconception care for improving perinatal outcomes: The time to act. *Maternal and Child Health Journal, 10*(5 Suppl), S3–S11.

Australian Government Department of Health. (2015). *National antenatal care guidelines*. Retrieved October 22, 2017, from. http://www.health.gov.au/internet/main/publishing.nsf/Content/phd-antenatal-care-index.

Bernloehr, A., Smith, P., & Vydelingum, V. (2005). Antenatal care in the European Union: A survey on guidelines in all 25 member states of the Community. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 122*(1), 22–32.

Chalmers, B., Mangiaterra, V., & Porter, R. (2001). WHO principles of perinatal care: The essential antenatal, perinatal, and postpartum care course. *Birth, 28*(3), 202–207.

Fahy, K. (2012). What is woman-centred care and why does it matter? *Women and Birth, 25*(4), 149–151.

Feijen-De Jong, E. I., Jansen, D. E., Baarveld, F., Van Der Schans, C. P., Schellevis, F. G., & Reijneveld, S. A. (2012). Determinants of late and/or inadequate use of prenatal healthcare in high-income countries: A systematic review. *European Journal of Public Health, 22*(6), 904–913.

Glanz, K., & Bishop, D. B. (2010). The role of behavioral science theory in development and implementation of public health interventions. *Annual Review of Public Health, 31*, 399–418.

Government of Nunavut, Department of Health and Social Service. (2009). *Nunavut Maternal and Newborn Health Care Strategy 2009–2014*. Iqaluit, Nunavut: Department of Health and Social Services, Government of Nunavut; ISBN 978-1-55325-169-9.

Haertsch, M., Campbell, E., & Sanson-Fisher, R. (1999). Prenatal care guideline comparisons between Canada, US, Australia: What is recommended for healthy women during pregnancy? *Birth, 26*(1), 24–30.

Handler, A., & Johnson, K. (2016). A call to revisit the prenatal period as a focus for action within the reproductive and perinatal care continuum. *Maternal and Child Health Journal, 20*, 2217–2227.

Heaman, M. I., Moffatt, M., Elliott, L., Sword, W., Helewa, M. E., Morris, H., et al. (2015). Perceptions of barriers, facilitators, motivators related to use of prenatal care: A qualitative descriptive study of inner city women in Winnipeg. *SAGE Open Medicine*. https://doi.org/10.1186/s12884-015-0431-5.

Hoang, H., Le, Q., & Terry, D. (2014). Women's access needs in maternal care in Tasmania Australia. *Women and Birth, 27*(1), 9–14.

Johnson, K., Posner, S. F., Biermann, J., Cordero, J. F., Atrash, H. K., Parker, C. S., et al. (2006). Recommendations to improve preconception health and health care—United States: A report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. *MMWR Recommendations and Reports, 55*(6), 1–23.

Keller, L. O., Strohschein, S., Lia-Hoagberg, B., & Schaffer, M. A. (2004). Population-based public health interventions: Practice-based and evidence-supported. Part I. *Public Health Nursing, 21*(5), 453–468.

Langer, B., Caneva, M. P., & Schlaeder, G. (1999). Routine prenatal care in Europe: The comparative experience of nine departments of gynaecology and obstetrics in eight different countries. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 85*(2), 191–198.

Lu, M. C. (2010). We can do better: Improving perinatal health in America. *Journal of Women's Health, 19*(3), 569–574.

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly, 15*(4), 351–377.

Miller, K. J., Couchie, C., Ehman, W., Graves, L., Grzybowski, S., Medves, J., Joint Position Paper Working Group. (2012). Rural maternity care. *Journal of Obstetrics and Gynaecology Canada, 34*(10), 984–991.

Misra, D. P., Guyer, B., & Allston, A. (2003). Integrated perinatal health framework: A multiple determinants model with a life span approach. *American Journal of Preventive Medicine, 25*(1), 65–75.

Muhajarine, N., Ng, J., Bowen, A., Cushon, J., & Johnson, S. (2012). Understanding the impact of the Canada prenatal nutrition program: A quantitative evaluation. *Canadian Journal of Public Health, 103*(7 Suppl 1), eS26–eS31.

Novick, G. (2009). Women's experience of prenatal care: An integrative review. *Journal of Midwifery & Women's Health, 54*(3), 226–237.

Price, S., Noseworthy, J., & Thornton, J. (2007). Women's experience with social presence during childbirth. *MCN, The American Journal of Maternal Child Nursing, 32*(3), 184–191.

Public Health Agency of Canada. (2013). *Implementing the population health approach*. Retrieved October 22, 2017, from https://www.canada.ca/en/public-health/services/health-promotion/population-health/implementing-population-health-approach/implementing-population-health-approach.html.

Shah, P. S., & Shah, J., Knowledge Synthesis Group on Determinants of Preterm/LBW Births. (2011). Maternal exposure to domestic violence and pregnancy and birth outcomes: A systematic review and meta-analyses. *Journal of Women's Health, 19*(11), 2017–2031.

Smylie, J., Kirst, M., McShane, K., Firestone, M., Wolfe, S., & O'Campo, P. (2016). Understanding the role of Indigenous community participation in Indigenous prenatal and infant-toddler health promotion programs in Canada: A realist review. *Social Science & Medicine, 150*, 128–143.

Sutherland, G., Yelland, J., & Brown, S. (2012). Social inequalities in the organization of pregnancy care in a universally funded public health care system. *Maternal and Child Health Journal, 16*, 288–296.

Sword, W., Heaman, M., Brooks, S., Tough, S., Janssen, P., Young, D., et al. (2012). Women's and care providers' perspectives of quality

prenatal care: A qualitative descriptive study. *BMC Pregnancy and Childbirth, 12*, 29.

Tarasoff, L. A. (2015). Experiences of women with physical disabilities during the perinatal period: A review of the literature and recommendations to improve care. *Health Care for Women International, 36*(1), 88–107.

United Nations. (1996). *Report of the fourth world conference on women, Beijing, 4–15 September 1995*. New York: United Nations, ISBN 92-1-130181-5.

Vonderheid, S. C., Norr, K. F., & Handler, A. S. (2007). Prenatal health promotion content and health behaviors. *Western Journal of Nursing Research, 29*(3), 258–276.

World Health Organization. (1986). *Health promotion, the Ottawa Charter for Health Promotion*. Retrieved October 22, 2017, from http://www.who.int/healthpromotion/conferences/previous/ottawa/en/.

World Health Organization. (2015) *WHO recommendations on health promotion interventions for maternal and newborn health*. Geneva: World Health Organization.