

# Follow-up of Cardiovascular Risk Following Complicated Pregnancy: a Single Centre Audit

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## Abstract

**Introduction:** Gestational diabetes mellitus, pregnancy-induced hypertension and pre-eclampsia are associated with significant long-term cardiovascular and metabolic risk to the woman. **Aims:** The primary aim of this audit was to determine whether women who develop these pregnancy-related complications were followed up by their general practitioners (GPs) with respect to cardiovascular risk after delivery. Another aim was to assess whether the condition was communicated from the maternity health care to the GP on discharge letter. **Methods:** The audit was carried out using a structured search via the general practice electronic health record system. **Conclusions:** This audit found a deficit of follow-up monitoring of blood pressure and glucose tolerance of the women in our study and deficient communication of the complication experienced from the hospital to primary care. These findings suggest that there is a lack of appreciation of the impact of pregnancy-related cardiovascular and metabolic complications on future maternal health.

## Introduction

Cardiovascular complications of pregnancy include the development of gestational diabetes, pregnancy-induced hypertension and pre-eclampsia. These complications not only affect maternal and fetal health during the pregnancy, they also signal significant long-term cardiovascular and metabolic maternal risk. It has now been established that women who develop gestational diabetes mellitus (GDM) have at least a seven-fold increased likelihood of developing type 2 diabetes later in life, compared to those with a normoglycemic pregnancy (Bellamy et al., 2009). It has similarly been shown that women who experience pregnancy-induced hypertension (PIH) and Pre-Eclamptic Toxaemia (PET) are at a greater risk of cardiovascular disease (CVD) later in life, with four times the risk of hypertension and twice

the risk of ischemic heart disease, stroke and venous thromboembolic events (Bellamy et al., 2007).

The reason for this association between pregnancy disorders and cardiovascular disease is not yet fully elucidated. The two leading possibilities are that: Firstly, that preeclampsia and cardiovascular disease share common risk factors that are unmasked by preeclampsia or secondly, that residual endothelial "damage" from preeclampsia leads to cardiovascular disease in later life (Roberts et al., 2010). In either case, pregnancy can be viewed as a screening test for a woman's future CVD risk by identifying an underlying predisposition to cardiovascular and metabolic disease (Nijdam et al., 2009, Mosca et al., 2011). Early identification and primary prevention of at-risk women may decrease CVD incidence by stimulating active monitoring and the early employment of primary preventative strategies. However, there is insufficient awareness about the implications of these disorders on future health among women and their health care providers, both in hospitals and in the community (Viana Pinto et al., 2014).

Young women of childbearing potential typically score as low-risk in currently used cardiovascular risk assessment tools such as SCORE and QRISK (Anderson et al, 2015). However, these tools do not take into account any obstetric complication history. Lack of awareness among physicians, lack of communication between primary care and maternity hospitals and the omission of the obstetric history from CVD risk assessment tools may result in a lost opportunity for early detection and targeted primary or secondary prevention of cardiovascular disease in these women.

## Audit Objectives

We hypothesised that despite evidence that complications during pregnancy affects future maternal

health, there would be a dearth of follow up of the woman's cardiovascular risk factors. The aims of this audit were to determine whether women who develop gestational diabetes, pregnancy induced hypertension, pre-eclampsia and eclampsia, were followed up by their general practitioners (GPs) with respect to cardiovascular risk after delivery. Another aim was to assess whether the condition was communicated from the maternity health care provider (HCP) (either a midwife or obstetrician) to the GP in the discharge letter.

## Methods

Keywords were used to search for patients within the practice's electronic patient health record (EPR), using health-software Socrates, between the period of 1st April 2008 and 1st April 2017. Patients who were coded as having experienced a pregnancy during this time were identified and their files were reviewed. Cases were included if the pregnancy was complicated by GDM, PIH, PET or eclampsia and were excluded if the pregnancy occurred before the woman joined the practice. Data was gathered about the year of the pregnancy complication, whether the complication was noted on the discharge letter, whether the woman's blood pressure was measured and recorded at the six-week postnatal check, and whether an Oral Glucose Tolerance Test (OGTT) was carried out within six months post-delivery. It was also noted whether the woman had formal total CVD risk assessment (such as QRISK) as a marker for cardiovascular health monitoring.

## Results

186 pregnancies were identified within the practice EPR over the specified period. 34 cases were found to have experienced either PIH, PET or GDM during the study period and were included in the analysis. All deliveries occurred within hospitals and had a maternity care discharge letter on file. Of the 34 identified pregnancies, 24 had GDM alone, one had PIH alone, six had both GDM and PIH while 3 were coded as PET. No cases of eclampsia were coded. (See Figure 1.)

The pregnancy complication was recorded in 8 (23.5%) of the hospital discharge letters. Maternal blood pressure was taken and recorded in 19 of 33 cases (57.6%) at the six-week postnatal visit, with one woman moving away for the GP area during this time.

## Pregnancy Complications Identified during Audit

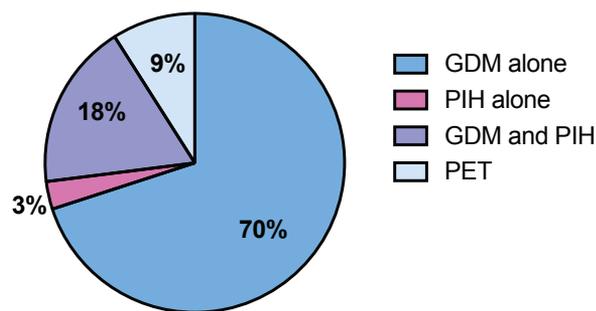


Figure 1. Cardiovascular complications of pregnancy identified in this audit. GDM - Gestational Diabetes Mellitus, PIH - Pregnancy-Induced Hypertension, PET - Pre-eclampsia Toxaemia.

Of those diagnosed with GDM, OGTTs were carried out within six months of delivery in 17 (56.6%). In contrast, among the women diagnosed with a complication other than GDM, none had an OGTT. It was found that 16 women (47%) had a lipid profile on file, while 20 (58.8%) had their BMI recorded. No woman had a formal total cardiovascular risk calculation on file (e.g. SCORE).

## Discussion

Obstetric complications represent cardiovascular risk factors unique to women. The relative importance of this has recently been highlighted with the inclusion of pre-eclampsia as a major risk factor for cardiovascular disease among women in the 2011 update of the American Heart Association guidelines (Mosca et al., 2011). Early identification of individuals at risk of cardiovascular disease allows for timely lifestyle and medical intervention. However, a lack of awareness among physicians involved in postpartum care of the importance of these factors results in an underestimation of the woman's risk.

The Centre for Disease Control estimates the prevalence of GDM to be up to 9% (DeSisto et al, 2014). This study identified 30 cases of GDM from 186 pregnancies, yielding a rate of 16.1%. The prevalence of hypertensive disorders of pregnancy (PIH and PET) is estimated to be between 5-10%, similar to a frequency of 11 cases (5.91%) in this study (Duley, 2009). The differences in prevalence between populations, particularly with respect to GDM, likely arises as a result of this study's small sample size. This study found only 53% of hospital discharge letters conveyed information relating to the woman's complication of pregnancy. This is very

similar to an Ontario-based study which found only 58% of obstetricians regularly inform GPs that a woman has experienced PIH, and only 36% highlight the subsequent increased lifetime risk of hypertension and CVD (MacDonald et al., 2007). There was a deficit of follow-up monitoring of BP and glucose tolerance of the women in our study. These findings suggest obstetricians and GPs are either unaware, undervalue, or lack resources to focus on the future health implications of these disorders of pregnancy. It is noted that the Irish national Mother and Infant Scheme does not provide any extra visits for postpartum OGTT and hypertension monitoring and therefore this lack of resourcing for care provision is likely a significant factor in impeding cardiometabolic evaluation following pregnancy.

To our knowledge, this is the first study undertaken in an Irish primary health care setting which looks at the monitoring of cardiovascular risk factors among women who have been identified as being potentially at an increased risk of CVD morbidity in the future. This audit highlights that awareness needs to be raised among clinicians regarding the importance of the obstetric history in determining CVD risk. In addition, CVD risk assessment tools should be updated to reflect this new understanding.

Guidelines are required which would standardise timelines for postpartum risk assessment by GPs. Research is required to identify the best method of ensuring follow-up, as studies have shown that among women who have a pregnancy-related CVD risk, attendance to maternity hospital appointments tends to be poor, particularly among PIH and GDM groups (Nowik et al., 2016). Potential methods to improve this would be standardised incorporation of postpartum risk factor screening as a part of primary care practise, such as at the six-week baby check and vaccination visits. Another option would be the utilisation of mHealth (mobile health) strategies to increase maternal health focus in the busy postpartum period.

Methods to improve communication between the hospital maternity care team and the woman's GP with respect to complications of pregnancy encountered should be explored. This is important as it provides an opportunity for the maternity care team to re-emphasise the potential future health implications of these complications to the GP. A potential change would be the use of discharge letters with a simple tick-

the-box option for common complications such as PIH. It is intended to repeat the analysis with the inclusion of multiple primary care centres, in both urban and rural areas, to increase the data power. This would enable a confirmation and a better estimation of the follow-up and communication deficit.

## Limitations

Limitations of this study include that this was a single centre study and relied on the coding of complications by GPs. It is likely that there are other cases of these conditions, not captured in this audit, which were not coded. In addition, it is possible that GPs are less likely to record negative findings as often as positive ones, which would lead to a systematic underestimation of risk management by GPs. The audit was based on a small sample size, which limits its power.

## Conclusion

It is now understood that certain obstetric complications place women at increased risk for cardiovascular and metabolic disease in the future. This study identified a deficit in the follow up of women who have experienced such complications in the postpartum period. It has also highlighted a deficiency in communication between primary and obstetric care practitioners. Much remains to be done to promote awareness regarding the association of certain complications of pregnancy and future cardiovascular risk. In addition, a standardisation of discharge letters with the inclusion of any complication experienced is recommended. Further research is needed to establish the most appropriate level and frequency of monitoring these women require in the months and years following the pregnancy.

How many of you chose an  
obs and gynae rotation  
because you're genuinely  
interested in it?



... And how many because  
you want to write a best-selling  
memoir about working in it?



@twisteddoodles

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