Asthma Management During Pregnancy

Dr Luke Grzeskowiak (on behalf of Prof Vicki Clifton)

PhD | BPharm(Hons) | GCertClinEpid | FSHP
Specialist Pharmacist, Flinders Medical Centre & University of Adelaide
Q1

• What proportion of pregnancy women you see have current asthma?

A. 0-10%
B. 10-20%
C. 20-30%
D. >30%
Q2

- How comfortable are you when managing asthma during pregnancy?

A. Extremely comfortable
B. Very comfortable
C. Moderately comfortable
D. Slightly comfortable
E. Not at all
Q3

• What proportion of pregnant women have asthma?

A. 3%
B. 6%
C. 12% ✓
D. 20%
Asthma & Adverse Perinatal Outcomes

- Pre-eclampsia: **RR 1.54 [1.32–1.81]**
- Gestational diabetes: **RR 1.39 [1.17–1.66]**
- Caesarean section: **RR 1.31 [1.22–1.39]**
- Antepartum haemorrhage: **RR 1.25 [1.10–1.42]**
- Postpartum haemorrhage: **RR 1.29 [1.18–1.41]**
- Placenta previa: **RR 1.23 [1.07–1.40]**
- Placental abruption: **RR 1.29 [1.14–1.47]**

Wang et al 2013 J Fetal Mat Med
Asthma & Adverse Perinatal Outcomes

• Congenital malformations: RR 1.11 [1.02-1.21]

• Cleft lip with or without cleft palate RR: 1.30 [1.01-1.68]

• Neonatal death: RR 1.49 [1.11-2.00]

• Neonatal hospitalisation: RR 1.50 [1.03-2.20]
Q4

• Adverse outcomes in asthmatic pregnancies are most likely the results of which of the following?

A. Exacerbations
B. Medications used to manage exacerbations
C. Preventer medications
D. Other factors associated with asthma
What Causes Adverse Perinatal Outcomes?

- Exacerbations OR Poor Control
- Use of Reliever or Preventer Medications
- Other Factors Associated with Asthma
- Treatment of Exacerbations
Asthma & Adverse Perinatal Outcomes

• Low birth weight: RR 1.46 [1.22-1.75]

• Small for Gestational Age: RR 1.23 [1.11-1.37]

• Preterm birth: RR 1.41 [1.23-1.62]
Maternal Asthma and Preterm Birth

Figure 4. Meta-analysis of cohort studies for preterm delivery by active asthma management. ‘Increased Risk’ indicates that the outcome is more likely in women with asthma; RR, relative risk; CI, confidence interval.

Murphy et al 2011 BJOG
Q5

- How many potentially preventable preterm births occur every week associated with maternal asthma?

A. 1
B. 5
C. 10
D. 25

Correct answer: D. 25
What are we doing to improve perinatal outcomes?

Interventions for managing asthma in pregnancy (Review)

Bain E, Pierides KL, Clifton VL, Hodyl NA, Stark MJ, Crowther CA, Middleton P

Bain et al 2014 Cochrane Database Syst Rev
Interventions

Authors’ conclusions

• “Based on eight included trials, of moderate quality overall, no firm conclusions about optimal interventions for managing asthma in pregnancy can be made”

• Three non-pharmacological intervention trials:
  – provided some support for the use of such strategies
  BUT
  – none powered to detect differences in important perinatal outcomes

Bain et al 2014 Cochrane Database Syst Rev
MAP Study

Management of asthma in pregnancy guided by measurement of fraction of exhaled nitric oxide: a double-blind, randomised controlled trial

Heather Powell, Vanessa E Murphy, D Robin Taylor, Michael J Hensley, Kirsten McCaffery, Warwick Giles, Vicki L Clifton, Peter G Gibson

Summary

Background Asthma exacerbations during pregnancy are common and can be associated with substantial maternal and fetal morbidity. Treatment decisions based on sputum eosinophil counts reduce exacerbations in non-pregnant women with asthma, but results with the fraction of exhaled nitric oxide (F_eNO) to guide management are equivocal.

Lancet 2011; 378: 983-90
See Comment page 963
Centre for Asthma and

Powell et al 2011 Lancet
MAP Study

### Table 1: Dose changes based on F\textsubscript{NO} and ACQ results for the F\textsubscript{NO} intervention algorithm

<table>
<thead>
<tr>
<th>Level</th>
<th>F\textsubscript{NO} concentration (ppb)</th>
<th>Symptoms (ACQ score)</th>
<th>ICS dose change</th>
<th>β2-agonist dose change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&gt;29</td>
<td>NA</td>
<td>↑ ICS × 1 step</td>
<td>No change</td>
</tr>
<tr>
<td>2</td>
<td>16–29</td>
<td>≤1·5</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>3</td>
<td>16–29</td>
<td>&gt;1·5</td>
<td>No change</td>
<td>↑ LABA × 1 step</td>
</tr>
<tr>
<td>4</td>
<td>&lt;16</td>
<td>≤1·5</td>
<td>↓ ICS × 1 step</td>
<td>No change</td>
</tr>
<tr>
<td>5</td>
<td>&lt;16</td>
<td>&gt;1·5</td>
<td>↓ ICS × 1 step</td>
<td>↑ LABA × 1 step</td>
</tr>
</tbody>
</table>

F\textsubscript{NO}=fraction of exhaled nitric oxide. ACQ=asthma control questionnaire. ICS=inhaled corticosteroid. NA=not part of the assessment at this F\textsubscript{NO} level. LABA=long-acting β2 agonist.

### Table 2: F\textsubscript{NO} algorithm treatment steps

<table>
<thead>
<tr>
<th>Step</th>
<th>ICS step</th>
<th>β2 step</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>Salbutamol as required</td>
</tr>
<tr>
<td>2</td>
<td>Budesonide 100 µg twice per day</td>
<td>Formoterol 6 µg twice per day</td>
</tr>
<tr>
<td>3</td>
<td>Budesonide 200 µg twice per day</td>
<td>Formoterol 12 µg twice per day</td>
</tr>
<tr>
<td>4</td>
<td>Budesonide 400 µg twice per day</td>
<td>Formoterol 2 × 12 µg twice per day</td>
</tr>
<tr>
<td>5</td>
<td>Budesonide 800 µg twice per day</td>
<td>Formoterol 2 × 12 µg twice per day</td>
</tr>
</tbody>
</table>

F\textsubscript{NO}=fraction of exhaled nitric oxide. ICS=inhaled corticosteroid.

### Table 3: Dose changes based on clinical assessment for the clinical algorithm (control)

<table>
<thead>
<tr>
<th>ACQ score</th>
<th>Treatment adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;1·5</td>
<td>↑ 1 step</td>
</tr>
<tr>
<td>0·75–1·5</td>
<td>No change</td>
</tr>
<tr>
<td>&lt;0·75</td>
<td>↓ 1 step</td>
</tr>
</tbody>
</table>

ACQ=asthma control questionnaire.

### Table 4: Clinical algorithm treatment steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Salbutamol as required</td>
</tr>
<tr>
<td>2</td>
<td>Budesonide 200 µg twice per day</td>
</tr>
<tr>
<td>3</td>
<td>Budesonide 400 µg twice per day</td>
</tr>
<tr>
<td>4</td>
<td>Budesonide 400 µg and formoterol 12 µg twice per day</td>
</tr>
<tr>
<td>5</td>
<td>Budesonide 800 µg and formoterol 24 µg twice per day</td>
</tr>
</tbody>
</table>

**Powell et al 2011 Lancet**
MAP Study

- Reduction in the prevalence (41% vs. 25%; \( p=0.011 \)) and incidence (incidence rate ratio 0.50, 95% CI 0.33–0.76; \( p=0.001 \)) of women experiencing exacerbations

Powell et al 2011 Lancet
What do you perceive to be the greatest barrier limiting translation of FeNO into clinical practice for pregnant asthmatics?

A. FeNO too complicated/expensive
B. No improvement seen in perinatal outcomes
C. Not validated in smokers
D. All of the above

A. 38%
B. 0%
C. 8%
D. 54%
MAP Study

• Limitations
  – Only included non-smokers
    • Cigarette use inhibits exhaled NO production
  – Implementation across routine clinical settings
    • Requires appropriate clinical expertise
    • Expensive
  – Use of FENO is not a stand-alone approach towards improving asthma management
    • Does not replace the need for appropriate asthma self-management education
      – Women were initially provided with asthma self-management skills including inhaler technique, knowledge, action plan, and adherence at their initial study visit
    • Ongoing monthly visits, however, were completed by blinded research assistants without additional respiratory training. Therefore, it is not possible to determine whether ongoing review and reinforcement of asthma self-management skills at later visits would have provided additional benefit.

Powell et al 2011 Lancet
Self-Management Education

• Asthma self-management education seen as an approach that is portable and transferable across healthcare settings
• In adults, studies have demonstrated that the provision of asthma self-management education reduces asthma exacerbations
  – Whether these interventions translate to the antenatal setting remains undetermined as uncertainty, concerns, and variability in practice surrounding medication use and asthma control during pregnancy are prevalent
• Previous non-randomised studies have demonstrated the effectiveness of self-management education in improving skills and knowledge about asthma during pregnancy
  – This service was built on successful adult programmes incorporating education, self-monitoring, regular review with optimisation of pharmacotherapy and a written plan for the management of unstable asthma
  – Further, this study identified that the majority of women have poor asthma self-management skills and knowledge, regardless of the severity of their asthma

Gibson et al 2002 Cochrane Database Syst Rev
Murphy et al 2005 ERJ
MAMMA Study

Multidisciplinary Approach to Management of Maternal Asthma (MAMMA)
A Randomized Controlled Trial

Angelina S. Lim, BPharm (Hons); Kay Stewart, PhD; Michael J. Abramson, PhD; Susan P. Walker, MD; Catherine L. Smith, MSc; and Johnson George, PhD
MAMMA Study

• 60 women
  – < 20 weeks gestation

• Randomised to intervention or usual care
  – Intervention (Pharmacist-led | GP Partnered)
    • Baseline Assessment
    • Asthma Education Session
    • Medication Management Review
    • Asthma and Pregnancy Brochure
    • Piko-6 meter
    • Monthly monitoring
  – Usual Care
    • Baseline Assessment
    • Asthma and Pregnancy Brochure
    • Follow-up at 3 and 6 months
    • ACQ score >2 prompts referral

Lim et al 2014 Chest
MAMMA Study

- Mean Difference -0.60 (95% CI -0.85, -0.36)

Lim et al 2014 Chest
MAMMA Study

• Key Limitations
  – ACQ score as primary outcome?
    • Only provides snapshot of asthma control over the previous week
  – Despite significant improvements in asthma control between groups, no women in either group reported experiencing any exacerbations during the study.
  – In contrast, in the MAP study by Powell et al. no statistically significant differences in ACQ scores were evident between groups at the end of the study, despite the intervention group experiencing greater than a 50% reduction in the incidence of exacerbations across gestation
  – This raises questions regarding the possibly subjective and variable manner in which exacerbations may be defined, given they often rely on individual awareness of symptoms and self-help seeking behaviours (e.g. unscheduled doctor or ED visit)
Evaluating Asthma Control

• Asthma control means the extent to which the effects of asthma can be seen in the patient, or have been reduced or removed by treatment

• Two domains:
  – Symptom control
  – Risk factors for future poor outcomes
### Definition of Asthma Symptom Control

<table>
<thead>
<tr>
<th>Good control</th>
<th>Partial control</th>
<th>Poor control</th>
</tr>
</thead>
<tbody>
<tr>
<td>All of:</td>
<td>One or two of:</td>
<td>Three or more of:</td>
</tr>
<tr>
<td>• Daytime symptoms ≤2 days per week</td>
<td>• Daytime symptoms &gt;2 days per week</td>
<td>• Daytime symptoms &gt;2 days per week</td>
</tr>
<tr>
<td>• Need for reliever ≤2 days per week†</td>
<td>• Need for reliever &gt;2 days per week†</td>
<td>• Need for reliever &gt;2 days per week†</td>
</tr>
<tr>
<td>• No limitation of activities</td>
<td>• Any limitation of activities</td>
<td>• Any limitation of activities</td>
</tr>
<tr>
<td>• No symptoms during night or on waking</td>
<td>• Any symptoms during night or on waking</td>
<td>• Any symptoms during night or on waking</td>
</tr>
</tbody>
</table>

† Not including SABA taken prophylactically before exercise. (Record this separately and take into account when assessing management.)

**Note:** Recent asthma symptom control is based on symptoms over the previous 4 weeks.

**Adapted from:**

Other Measures of Asthma Control

- Asthma Control Questionnaire (ACQ)
- 6 or 7 questions
- Each question scored on 7 point scale from 0 to 6
- Questions equally weighted
- > 1.5 = uncontrolled asthma

1. On average, during the past week, how often were you woken by your asthma during the night?
2. On average, during the past week, how bad were your asthma symptoms when you woke up in the morning?
3. In general, during the past week, how limited were you in your activities because of your asthma?
4. In general, during the past week, how much shortness of breath did you experience because of your asthma?
5. In general, during the past week, how much of the time did you wheeze?
6. On average, during the past week, how many puffs of short-acting bronchodilator (e.g. Ventolin) have you used each day?
7. FEV1 % Predicted

Juniper et al 2000 Am J Respir Crit Care Med

http://www.qoltech.co.uk/acq.html
Q7

• Which of the following does not represent a modifiable risk factor for poor asthma outcomes?

A. Uncontrolled asthma
B. Cigarette smoking
C. Obesity
D. Previous ICU admission
E. Mental health illness
Risk Factors for Poor Asthma Outcomes

- Having one or more of these risk factor increases the risk of exacerbations even if symptoms are well controlled
  - Potentially modifiable
    - Uncontrolled asthma symptoms
    - ICS not prescribed; poor ICS adherence; incorrect inhaler technique
    - High SABA use
    - Low FEV1
    - Major psychological or socioeconomic problems
    - Exposures; smoking, allergen exposure
    - Comorbidities: obesity, rhinosinusitis, food allergy
    - Pregnancy
  - Non-modifiable
    - Even being intubated or admitted to ICU for asthma
    - Having 1 or more severe exacerbations in the last 12 months
Q8

- A reduction in medication adherence during pregnancy is likely the result of?

A. Maternal side-effects
B. Concern for fetal harm
C. Financial constraints
D. Improved symptoms
Medication Adherence in Pregnancy

• Pregnancy represents a major challenge in the management of asthma
  – Can alter the course of asthma severity and its treatment, which in turn can affect pregnancy outcomes.

• It remains common for pregnant women to cease their medications, with or without consultation with doctors
  – Non-adherence a key driver of worsening asthma during pregnancy
  – Decisions may be driven by:
    • Perceived lack of need to continue their medications
    • Lack of support and guidance from health professionals regarding how to manage their asthma medications; and/or
    • Concerns regarding the safety of asthma medications during pregnancy

• Concerns not unique to pregnant women
  – In situations where asthma was well controlled, over 25% of family physicians would instruct their pregnant patients to decrease or discontinue asthma medication during pregnancy
Q9

- Which of the following is TRUE with respect to asthma severity:

A. Defined by type and amount of treatment needed to maintain good control

B. Can only be determined prior to commencing a preventer

C. Defined by severity of acute flare-ups

A. B. C. 38% 54% 8%
Exacerbations

- ‘Flare-Ups’ now preferred term
- Acute or sub-acute worsening in symptoms and lung function from the patient’s usual status

<table>
<thead>
<tr>
<th>Severity</th>
<th>Definition</th>
<th>Example/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Worsening of asthma control that is only just outside the normal range of variation for the individual (documented when patient is well)</td>
<td>More symptoms than usual, needing reliever more than usual (e.g. &gt;3 times within a week for a person who normally needs their reliever less often), waking up with asthma, asthma is interfering with usual activities</td>
</tr>
</tbody>
</table>

| Moderate | Events that are (all of): troublesome or distressing to the patient, require a change in treatment, not life-threatening, do not require hospitalisation. | More symptoms than usual, increasing difficulty breathing, waking often at night with asthma symptoms |

| Severe    | Events that require urgent action by the patient (or carers) and health professionals to prevent a serious outcome such as hospitalisation or death from asthma | Needing reliever again within 3 hours, difficulty with normal activity |
Q10

True or False:

- Exacerbations are much more common in the second half of pregnancy?

A. True

B. False

✓
Lessons from Practice

- Prospective study of pregnant asthmatics at the Lyell McEwin Hospital
  - N=189
  - Seen at 12, 20, 30, 36 weeks gestation by respiratory nurse

<table>
<thead>
<tr>
<th>Table 1. Maternal characteristics at study entry, N=189</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMI Category, n (%)</strong></td>
</tr>
<tr>
<td>Normal Weight                                      76 (40.2)</td>
</tr>
<tr>
<td>Overweight                                         46 (24.3)</td>
</tr>
<tr>
<td>Obese                                              67 (35.4)</td>
</tr>
<tr>
<td><strong>Socioeconomic Status, n (%)</strong></td>
</tr>
<tr>
<td>1 (Lowest)                                         100 (52.9)</td>
</tr>
<tr>
<td>2                                                   61 (32.3)</td>
</tr>
<tr>
<td>3                                                   6 (3.2)</td>
</tr>
<tr>
<td>4                                                   12 (6.3)</td>
</tr>
<tr>
<td>5 (Highest)                                        10 (5.3)</td>
</tr>
<tr>
<td><strong>Smoking Status</strong></td>
</tr>
<tr>
<td>Never/Former Smoker                                128 (67.7)</td>
</tr>
<tr>
<td>Quit Smoking During Pregnancy                      23 (12.2)</td>
</tr>
<tr>
<td>Current Smoker                                     38 (20.1)</td>
</tr>
<tr>
<td><strong>Baseline ICS Use</strong></td>
</tr>
<tr>
<td>Yes                                                61 (32.3)</td>
</tr>
<tr>
<td>No                                                 128 (67.7)</td>
</tr>
<tr>
<td><strong>Baseline ICS Type</strong></td>
</tr>
<tr>
<td>ICS                                                13 (21.3)</td>
</tr>
<tr>
<td>ICS + LABA                                         48 (78.7)</td>
</tr>
</tbody>
</table>
Patterns in Asthma Control
Patterns in Asthma Control

![Graph showing the percentage of outcomes over weeks of gestation, with two lines representing Loss of Control and Exacerbation.](image)
Patterns in Asthma Control

![Graph showing patterns in asthma control over weeks of gestation. The graph plots the frequency of outcomes (vertical axis) against weeks of gestation (horizontal axis). Two lines represent different outcomes: Loss of Control is indicated by a green line, and Exacerbation is indicated by a blue line. The graph shows an increase in the frequency of both outcomes as gestation progresses.]
Patterns in Asthma Control

Lessons Learnt:

• Exacerbations protective of adverse perinatal outcomes!
  – Results biased by definition of exacerbation
    • Requires self-awareness and indicates self-help seeking behaviour
• Control likely to be more important across pregnancy
• Timing of exacerbations/poor control could correlate with different perinatal outcomes
• Interventions must be introduced early in pregnancy
  – Pre-conception management ideal
Role of Self-Management Education

- Investigated following introduction of Asthma Management Service (AMS)
- First AMS Visit (23 weeks)
- Last AMS Visit (32 weeks)

<table>
<thead>
<tr>
<th>Table 1. Asthma Self-Management Education Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact of pregnancy on asthma control</td>
</tr>
<tr>
<td>Impact of asthma on pregnancy and pregnancy outcomes</td>
</tr>
<tr>
<td>Medication use (including safety in pregnancy; medication adherence; inhaler technique)</td>
</tr>
<tr>
<td>Recognition of asthma deterioration/symptoms</td>
</tr>
<tr>
<td>Provision and use of AAP</td>
</tr>
<tr>
<td>Trigger identification and avoidance</td>
</tr>
<tr>
<td>Smoking cessation</td>
</tr>
</tbody>
</table>
Role of Self-Management Education

Table 4. Relative risk of asthma exacerbations and persistent uncontrolled asthma form women in the antenatal asthma management service group compared to standard care

<table>
<thead>
<tr>
<th></th>
<th>RR</th>
<th>95% CI</th>
<th>aRR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate/Severe Exacerbation</td>
<td>0.65</td>
<td>0.32-1.35</td>
<td>0.69</td>
<td>0.33-1.42</td>
</tr>
<tr>
<td>Loss of Control</td>
<td>0.62</td>
<td>0.41-0.94</td>
<td>0.67</td>
<td>0.46-0.99</td>
</tr>
<tr>
<td>Persistent Uncontrolled Asthma</td>
<td>0.44</td>
<td>0.21-0.89</td>
<td>0.48</td>
<td>0.26-0.90</td>
</tr>
<tr>
<td>(ACQ&gt;1.5 on ≥2 study visit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: RR, relative risk; ACQ, asthma control questionnaire

Adjusted for maternal age, smoking status, parity, BMI, and baseline ICS use
Education is Key

• Make the time to educate and manage maternal asthma

• Ensure pregnant women have an asthma action plan AND that they know how to use it

Asthma Treatments During Pregnancy

*Before considering stepping up, check symptoms are due to asthma, inhaler technique is correct, and adherence is adequate

http://www.asthmahandbook.org.au
Q11

- Women who enter pregnancy on a ICS/LABA combination should be swapped to a ICS alone preparation?

A. True
B. False
Q12

True or False

• If oral steroids are required during pregnancy they should be used at a lower dose?

A. True
B. False
Asthma Treatments

- No increased risk of adverse outcomes associated with the use of:
  - SABA
  - ICS
  - ICS/LABA
  - Keep women on treatments that control their symptoms

- Systemic steroids;
  - Use in first trimester associated with a small increase in the risk of oral cleft
  - Associated with preterm delivery, low birth weight, and small-for-gestational age infants
  - Use of steroids is a marker of severe asthma
  - Use systemic steroids where required to manage exacerbations
Q13

• It is appropriate to consider step-down therapy during pregnancy?

A. Yes
B. No
C. Depends
Q14

- Regarding the use of peak flow meters, which of the following is TRUE?

A. PEF falls during pregnancy
B. Can be used instead of other lung function tests
C. Is useful in those with difficulty perceiving airflow limitations
D. Values are highly reproducible

• Regarding the use of peak flow meters, which of the following is TRUE?

A. B. C. D.
38% 15% 8%
Maternal Asthma and Mental Health

Percentage of Women Who Have Experienced Uncontrolled Asthma According to Weeks Gestation

Frequency of Uncontrolled Asthma According to Weeks Gestation

- Depression/anxiety
- No depression/anxiety
## Maternal Asthma and Mental Health

### Table 3. Relative risk of asthma exacerbations, loss of control, and recurrent uncontrolled asthma according to maternal self-reported depression and anxiety during pregnancy

<table>
<thead>
<tr>
<th></th>
<th>RR</th>
<th>95% CI</th>
<th>aRR†</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate/Severe Exacerbation</td>
<td>0.87</td>
<td>0.50-1.50</td>
<td>0.86</td>
<td>0.50-1.49</td>
</tr>
<tr>
<td>Loss of Control</td>
<td>1.62</td>
<td>1.15-2.28</td>
<td>1.54</td>
<td>1.11-2.12</td>
</tr>
<tr>
<td>Recurrent Uncontrolled Asthma (ACQ6&gt;1.5 on ≥2 study visit)</td>
<td>2.45</td>
<td>1.21-4.94</td>
<td>2.12</td>
<td>1.16-3.89</td>
</tr>
</tbody>
</table>

Abbreviations: RR, relative risk; ACQ, asthma control questionnaire

†Adjusted for maternal age, smoking status, parity, BMI, and baseline ICS use
Maternal Asthma and Cigarette Smoking

Perinatal outcomes following maternal asthma and cigarette smoking during pregnancy

Nicolette A. Hodyl¹, Michael J. Stark¹, Wendy Scheil², Luke E. Grzeskowiak¹ and Vicki L. Clifton¹

Affiliations: ¹Robinson Institute, School of Paediatrics and Reproductive Health, University of Adelaide, Adelaide, and ²Epidemiology Unit, Dept of Health, Adelaide, Australia.

Correspondence: V.L. Clifton, Robinson Institute, University of Adelaide, Lyell McEwin Hospital, Haydown Road, Elizabeth Vale, 5112, South Australia, Australia. E-mail: vicki.clifton@adelaide.edu.au

ABSTRACT  Does cigarette smoking in pregnancy explain the increased risk of adverse perinatal outcomes that occur with maternal asthma or does it compound the effect?

Using population based birth records, a retrospective analysis was conducted of all singleton pregnancies in South Australia over 10 years (1999–2008; n=172,305), examining maternal asthma, cigarette smoking and quantity of smoking to estimate odds ratios. Compared with nonasthmatic females who did not smoke during pregnancy, both asthmatic females who smoked and those who did not smoke during pregnancy had a significantly increased risk of gestational diabetes, antepartum haemorrhage, polyhydramnios, premature rupture of membranes, emergency Caesarean section, and the child being small for gestational age and having congenital abnormalities. These associations suggest that asthma, independently of maternal smoking, increases the risk of these adverse perinatal outcomes. Maternal smoking was itself associated with an increased risk of a number of poor neonatal outcomes, with a dose–response relationship observed. Notably, maternal asthma combined with cigarette smoking significantly increased the risk of preterm birth and urinary tract infections to a greater degree than with either exposure alone.

Maternal asthma and cigarette smoking during pregnancy are both independently associated with adverse perinatal outcomes and, combined, compound the risk of preterm birth and urinary tract infections.
Maternal Asthma and Cigarette Smoking

Hodyl et al 2014 Eur Respir J

<table>
<thead>
<tr>
<th></th>
<th>Non-Asthmatic Smokers</th>
<th>Asthmatic Non-Smokers</th>
<th>Asthmatic Smokers</th>
<th>p-value for interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preterm Birth</td>
<td>1.71 (1.62-1.81)</td>
<td>1.15 (1.02-1.29)</td>
<td>2.30 (2.03-2.63)</td>
<td>0.007</td>
</tr>
</tbody>
</table>

**TABLE 5** Odds ratios for neonatal outcomes, according to maternal asthma and cigarette smoking status during pregnancy, using nonasthmatic nonsmokers as the reference population.

- **OR**: odds ratio
- **Adjusted OR**: adjusted odds ratio (95% CI)
- **IUGR**: intrauterine growth restriction
- **SGA**: small for gestational age
- **<32 weeks**: odds ratios adjusted for maternal age, parity, ethnicity, Socio-Economic Indexes for Areas (SEIFA)
- **<37 weeks**: odds ratios adjusted for maternal age, parity, ethnicity, SEIFA, year of birth, pre-existing hypertension, pre-existing diabetes
- **<37 weeks**: odds ratios adjusted for maternal age, parity, ethnicity, SEIFA, year of birth, pre-existing hypertension, pre-existing diabetes, method of delivery, hypertensive disorders of pregnancy
- **<4 h**: odds ratios adjusted for maternal age, parity, ethnicity, SEIFA, year of birth, pre-existing hypertension, pre-existing diabetes, method of delivery, hypertensive disorders of pregnancy, pre-term birth, pre-existing diabetes, hypertensive disorders of pregnancy

Figures in bold indicate significant adjusted OR at p<0.05.
Nicotine Replacement Therapy

- Pregnancy is a good time for smoking intervention
- Quit SA Pregnancy Quitline Referral
  - Support for woman and partner
- NRT can be used if required
  - Controversy regarding their efficacy and safety
    - Potential neuroteratogen
  - Preference towards intermittent short-acting forms
    - Patches reserved for second line management
  - Nicotine requirements can increase during pregnancy
- Oral options avoided
  - Limited data on bupropion and even less on varenicline
Rhinitis

- **Acute (infectious)**
  - Short term
  - Can be managed with steam | sodium chloride drops
  - **Decongestants**

- **Allergic**
  - Responds well to medications
  - Can treat as per non-pregnant patients (next slide)

- **Other**
  - ‘Pregnancy rhinitis’
    - Presents with slow/gradual onset early in pregnancy
    - Does not respond well to medications
    - No treatment recommended
    - Disappears following delivery
Management Options for Allergic Rhinitis

- Avoid decongestants in first trimester
  - limited role in managing rhinitis anyway
Troubleshooting Asthma - Comorbidities

- Rhinitis (allergic and non-allergic)
- Chronic sinusitis
- Upper airway dysfunction
- Hyperventilation
- Mental illness
- Smoking Nicotine dependence
- COPD
- Respiratory infections
- Other respiratory conditions
- Other allergic conditions
- Hormonal changes
- OSA
- Obesity
- GORD

+ Pregnancy
  - Iron deficiency anaemia
  - Dyspnoea of pregnancy
Take Home Messages

• Manage asthma during pregnancy as for asthma in other adults, aiming to maintain the best possible asthma control and to avoid exacerbations
  – Do not withhold preventer treatment due to pregnancy
  – Step-Up the regimen as necessary to maintain control
  – Step-Down only if woman taking inappropriately high dose
  – Provide pregnant women an asthma action plan
  – Offer regular review of asthma every 4-6 weeks
  – Identify and manage comorbid conditions that may affect asthma control or mimic asthma symptoms
Q2

• How comfortable are you when managing asthma during pregnancy?

A. Extremely comfortable
B. Very comfortable
C. Moderately comfortable
D. Slightly comfortable
E. Not at all
Resources

- SA Perinatal Practice Guidelines
- Australian Asthma Handbook:  
  http://www.asthmahandbook.org.au/
- National Asthma Council:  
- Asthma Australia:  
- Asthma SA
- Pocket Guide for Asthma Management and Prevention,  
  GINA 2015
Asthma Management During Pregnancy

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Questions?