GUIDELINES

# Assessing the onset of pre-eclampsia in the hospital day unit: summary of the pre-eclampsia guideline (PRECOG II)

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**This is one of a series of *BMJ* summaries of new guidelines, which are based on the best available evidence; they highlight important recommendations for clinical practice, especially where uncertainty or controversy exists. Further information about the guidelines and a list of the members of the PRECOG development group are in the full version of this article on bmj.com.**

## Why read this summary?

Pre-eclampsia remains a leading cause of maternal death, with 72% of pre-eclampsia cases associated with substandard care.[1] One in 10 pregnant women develop partial signs or symptoms (73 000 a year in the United Kingdom); about 20% of these progress to pre-eclampsia.[2 3] This article summarises recommendations from the Pre-Eclampsia Community Guideline (PRECOG) Group[4] under the auspices of the charity Action on Pre-eclampsia. The recommendations cover the assessment of women with suspected pre-eclampsia by hospital midwives in day assessment units and complements our previous community based advice.[5 6]

## Recommendations

PRECOG recommendations (see table 1 for definitions used) are based on systematic review of evidence and expert consensus, graded A, B, C, or D; a "good practice point"(GPP) is based on the guideline development group's experience (box 1 on bmj.com). The grading is shown in parentheses after each recommendation.

Midwives in a day assessment unit should offer women the following step-wise investigations and management.

### Step 1

*For all referrals for suspected pre-eclampsia*

- Take a history, including checking for PRECOG risk factors for pre-eclampsia (table 2) (B/C)
- Confirm the presence of any one of new hypertension (B), new proteinuria (B), maternal symptoms of pre-eclampsia (such as headache, visual disturbances, epigastric pain, vomiting) (C), and clinical suspicion of fetal compromise (B)
- Measure blood pressure with equipment that is accurate in individual hypertensive pregnant women (C). Use appropriate cuff size (C)—thigh cuffs (18×36 cm) for women with an arm circumference of 41 cm or more. Follow PRECOG recommendation 6 for reducing errors in blood pressure measurement[6] (C, D, GPP)
- Estimate proteinuria by dipsticks (C) and follow PRECOG recommendation 7 to improve reliability.[6] Accuracy is not increased by retesting a new sample (GPP). Use the higher of the dipstick results from the community and the day assessment unit (GPP)

**Table 2 | Factors that can be measured early in pregnancy that increase the likelihood of pre-eclampsia in any given pregnancy[6]**

| Factor | PRECOG grade |
|---|---|
| First pregnancy | B |
| Multiparous: | |
| Pre-eclampsia in any previous pregnancy | B |
| ≥10 years since last baby | B |
| Age ≥40 years | B |
| Body mass index of ≥35 | B |
| Family history of pre-eclampsia (mother or sister) | B |
| Diastolic blood pressure of ≥80 mm Hg at booking | B |
| Proteinuria (of ≥1+ on more than one occasion or quantified at ≥0.3 g/24 h) at booking | C |
| Multiple pregnancy | B |
| Certain underlying medical conditions* | B |

*Pre-existing hypertension; pre-existing renal disease; pre-existing diabetes; antiphospholipid antibodies present.

**Table 1 | Definitions used in the PRECOG recommendations**

| Term | Definition used in guideline |
|---|---|
| Fetal compromise (clinical suspicion) | Reduced fetal movements, small for gestational age infant (clinically assessed) |
| Hypertension | A diastolic blood pressure of ≥90 mm Hg |
| New hypertension | Hypertension at or after 20 weeks' gestation in a woman with a diastolic blood pressure of <90 mm Hg before 20 weeks |
| Pre-existing hypertension | A diastolic blood pressure before pregnancy or at booking (before 20 weeks) of ≥90 mm Hg |
| New proteinuria | The presence of proteinuria as shown by 1+ (0.3 g/l) or higher on dipstick testing; a protein to creatinine ratio of ≥30 on a random sample; or a urine protein excretion of ≥300 mg/24 h |
| Significant proteinuria | Urine protein excretion ≥300 mg/24 h |
| Pre-eclampsia | New hypertension and significant proteinuria at or after 20 weeks of pregnancy, confirmed if it resolves after delivery |
| Superimposed pre-eclampsia | The development of features of pre-eclampsia in the context of pre-existing hypertension, pre-existing proteinuria, or both |

**Liver function (gestation specific values, 95% reference ranges (2.5th centile to 97.5th centile)) in normal population[11] and platelet count[12] and creatinine concentration[13] (pregnancy specific measures)**

**Liver function tests***

***Aspartate aminotransferase (IU/l)***
Non-pregnancy: 7-40
1st trimester: 10-28
2nd trimester: 11-29
3rd trimester: 11-30

***Alanine aminotransferase (IU/l)***
Non-pregnancy: 0-40
1st trimester: 6-32
2nd trimester: 6-32
3rd trimester: 6-32

**Pregnancy specific measures for platelet count and creatinine**
Platelet count: ≥150× $10^9$/l
Creatinine: ≤90 µmol/l

## Step 2

*For suspicion of fetal compromise and/or maternal symptoms*

- Follow local protocols.

*For new hypertension (no maternal symptoms or fetal compromise)*

- Admit women with a diastolic blood pressure ≥110 mm Hg or systolic blood pressure ≥170 mm Hg (D).
- Arrange a medical review to consider admission for women with a diastolic blood pressure 100-109 mm Hg or systolic blood pressure 160-169 mm Hg (D).
- Measure the platelet count, liver function (aspartate aminotransferase or alanine aminotransferase), and serum creatinine for women with a diastolic blood pressure 90-99 mm Hg. Do not test for serum urate if proteinuria is not present. Use pregnancy specific ranges (box, table 3) (C); do not use results to predict subsequent pre-eclampsia (C). Use results to identify features of HELLP syndrome (name derived from its features: Haemolysis, Elevated Liver enzymes, and Low Platelet count) and underlying concurrent conditions, and as a baseline to determine rate of change and also appropriate management if pre-eclampsia develops (GPP).
- Arrange a Doppler scan of the umbilical artery to assess fetal risk if onset of new hypertension is ≤36 completed weeks (B).

**Table 3 | Pregnancy specific ranges (calculated from 2 standard deviations above and below mean values) for serum uric acid by gestational age (µmol/l)[10]**

| Gestational age | Range |
|---|---|
| Not pregnant | 128-364 |
| At 4 weeks | 152-328 |
| At 8 weeks | 50-330 |
| At 12 weeks | 79-267 |
| At 16 weeks | 93-285 |
| At 24 weeks | 116-276 |
| At 32 weeks | 110-322 |
| At 36 weeks | 120-344 |
| At 38 weeks | 157-381 |
| Post-partum | 161-389 |

Once the test results are available, do the following:

- Arrange medical review of abnormal blood test results or umbilical artery Doppler readings (GPP)
- Repeat step 1 assessments in one week if blood test results are normal; do not routinely repeat blood tests unless signs or symptoms change or routine repeat testing is recommended after medical review (D/GPP)
- Discuss the results and the plan for antenatal care with the woman (GPP).

*For new proteinuria (no maternal symptoms or fetal compromise)*

For 2+ proteinuria, do the following:

- Measure the platelet count; aspartate aminotransferase or alanine aminotransferase; serum creatinine; and serum urate (C). Use abnormal results for pregnancy specific ranges to diagnose partial HELLP syndrome, indicate underlying concurrent conditions, predict risk of poor maternal and/or fetal outcome, and establish a baseline for monitoring disease progression and predicting morbidity if pre-eclampsia does develop (C/D)
- Arrange a 24 hour urine collection to quantify proteinuria (C)
- Arrange a Doppler scan of the umbilical artery to assess fetal risk if proteinuria onset is ≤36 completed weeks (C)
- Arrange a medical review of abnormal or significant results (GPP).

For 1+ proteinuria, do the following:

- Exclude significant proteinuria by calculating the urinary protein to creatinine ratio from a random sample (C) or confirm and quantify by 24 hour urine collection (C). Use a threshold ratio of 30 to exclude significant proteinuria.[14]

*For new hypertension and proteinuria*

- Admit women with a diastolic blood pressure of ≥90 mm Hg and new proteinuria of ≥2+. (C)
- Admit women with a diastolic blood pressure of ≥110 and new proteinuria of ≥1+. (C)
- Arrange a medical review to consider admission of women with a diastolic blood pressure of 100-109 mm Hg and new proteinuria of 1+ (C)
- For women with diastolic blood pressure of 90-99 mm Hg and 1+ proteinuria, exclude significant proteinuria using the urinary protein creatinine ratio from a random sample (C) or confirm and quantify by 24 hour urine collection. (C)

Once the test results are available, do the following:

- Admit if significant proteinuria is confirmed or the protein creatinine ratio is ≥30 with new hypertension (C)
- Arrange a medical review of abnormal blood test results or Doppler readings. Discuss the results and the plan for antenatal care with the women. (GPP)

*For transient new hypertension or new proteinuria*

- Recheck women with no hypertension or proteinuria (after step 1) in the community within

seven days. Women in this category are at higher risk of developing pre-eclampsia (51% subsequently develop hypertension or pre-eclampsia in the pregnancy).[15] Refer back to the day assessment unit if signs or symptoms recur with community monitoring (PRECOG recommendations 4 and 5).[6]

### Minimum standards

We recommend minimum standards for facilities and staff in any consultant led, hospital based day assessment unit,[4] especially the following standards:

- Medical review requires specialty registrar ST3 or above (GPP)
- Allocate all women referred for further assessment to a named consultant (GPP)
- Offer written and verbal information so that women understand the purpose and outcome of the assessment at the day assessment unit. Women have a full and equal right to determine and be involved in their antenatal care. (GPP)

## Overcoming barriers

Over 90% of day assessment units share staff with antenatal and labour wards and often have lower priority for staff.[9] However, their remits have enlarged to include triage, management of labour, post-maturity assessment, and postnatal assessment. The pre-eclampsia assessments vary across these units, and equipment is often inadequate or poorly maintained.[9] Errors have been implicated in maternal deaths.[16] Minimum standards are essential for a cost effective service from day assessment units. Standardising assessments will be cost saving and preferred by women when unnecessary admission is avoided.[17] Adoption, training, and implementation support is available via www.apec.org.uk.

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## FROM OUR ARCHIVE Women doctors (1870)

Are the medical schools of Great Britain to be disgraced by demoralising spectacles such as I have seen in Paris in connection with the education of female medical students? I have seen in M. Fort's rooms a young woman dissecting the thigh of a male subject while several male students were dissecting other parts of the same body. I have seen another young woman, with unblushing front, taking notes along with young men, her fellow-students, of a lecture by Professor Pajot exclusively devoted to the mons Veneris, clitoris, and hymen, illustrated by curious anecdotes and preparations. These disgusting spectacles made a strong impression upon my mind; and I was glad to be able to show to inquiring friends recent articles in the BRITISH MEDICAL JOURNAL as proofs that notwithstanding the statements of *La Liberté* and other Parisian prints, purity is in our country, as it ever has been, the cherished ideal of womanhood, and that such sights as I have now described would be there regarded as too horribly revolting to be tolerated.

No doubt, if women are to have a fair chance of being equal to men as physicians and surgeons, they must learn their profession along with and in the same way as men. But then, are women-doctors required? Is it not rather a certainty that men are physically better adapted than women for medical practice, and that men-doctors will in ninety-nine cases in a hundred successfully compete with women-doctors ? Is it not cruel, therefore, to women and injurious to men to allure women to barter modesty for medicine?

Women-doctors: Parisian socialists, and Edinburgh professors. *BMJ* 1870;1:559-60, doi:10.1136/bmj.1.491.558

The entire archive of the *BMJ*, going back to 1840, is now available at www.bmj.com/archive.

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A PATIENT'S JOURNEY

# Persistent pain

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This patient describes the strategies she has developed for coping with her persistent pain from longstanding pancreatitis

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In his annual report, published in March this year, Professor Sir Liam Donaldson, the UK government's principal medical adviser, noted that almost eight million Britons have persistent chronic pain, which can prevent them working and ruin the quality of their lives. And yet, he said, because the UK has only one pain management specialist for every 250 000 citizens, only one in seven people with persistent pain ever sees a specialist.

I've had chronic pancreatitis for over 12 years. I wasn't your typical pancreatitis patient: I wasn't male or in my 70s, and I hadn't misused alcohol. I'm one of a third of people for whom the cause is unknown. Quite simply, it's a pig: persistent pain, tiredness, and frequent diarrhoea. And it disrupts your life. I kept working for over two years, but I was going downhill rapidly and I reluctantly had to take early retirement.

Part of coping with persistent pain is to give it as little airtime as possible: talking about it doesn't win friends and influence people. So it's strange to be writing this, but it's a chance to raise the profile of persistent pain and pain management.

## Diagnosis

I was told the pain would probably be with me for ever when the pancreatitis was diagnosed after months of tests. I was already learning to live with it. Over the following months acceptance and coping got harder as I was assessed for whether a pancreatectomy might stop the pain. I saw three consultants (in gastroenterology, diabetes, and pancreatic surgery), who outlined the benefits and risks. It wasn't the right answer for me but it highlights a common dilemma: a chance to be free of pain sets you hoping and decisions about major intrusive procedures become an emotional roller coaster.

### USEFUL RESOURCES

British Pain Society (www.britishpainsociety.org.uk)—A multiprofessional organisation advancing the understanding and management of pain. Churchill House, 35 Red Lion Square, London WC1R 4SG

Chronic Pain Policy Coalition (www.paincoalition.org.uk/index.htm)—Organisation working to improve the lives of people who live with chronic pain

Chief Medical Officer. Pain: breaking through the barrier. In: *Chief Medical Officer 2008 Annual Report*. www.dh.gov.uk/en/Publicationsandstatistics/Publications/AnnualReports/DH_096233

Healthtalkonline (www.healthtalkonline.org)—Charity website specialising in patients' stories and experiences

Youthhealthtalk (www.youthhealthtalk.org)— Charity website specialising in young patients' stories and experiences

Pancreatitis Supporters' Network (www.pancreatitis.org.uk)—Voluntary group providing information, support, and networking for people with pancreatitis

*Chronic pancreatitis* (www.creoninfo.co.uk/pdf/Booklet1.pdf)—Leaflet about pancreatitis and its treatments, by J P Neoptolemos, professor of surgery at University of Liverpool

Expert Patient Programme (www.expertpatients.co.uk)—NHS supported programme, led by lay people, for people who live with long term conditions.

## Referral to a pain clinic

I'm a psychologist so I was already using ways of managing pain: relaxation, goal setting, staying positive. I was referred to a pain clinic to see if I could improve what I was already doing. This was about 10 years ago and services have moved on, but there are still lessons to be learnt even now, and the learning process is continuous. Every patient had months of waiting to see a pain consultant, before being referred via another waiting list to see a psychologist, then a third wait for group sessions to learn a few basic ways to manage pain. Three waiting lists before learning useful strategies such as relaxation and positive thinking.

It didn't make sense. Why wait so long to talk to people about understanding pain and simple ways to cope with it? All that time for a downward spiral with patients off work, with bouts of depression, repeated clinic attendance, increased use and side effects of painkillers, frustration with NHS staff, and ultimately referral to an intensive pain management programme.

Coping with persistent pain effectively depends on patients understanding and managing their pain. And they need to begin at the start of their "patient journey" not at the end. People need a positive message: you can make a huge difference yourself and here are some of the ways you can do it. Ways of managing pain can be easily taught using everyday language. If people don't need simple pointers about relaxation or pacing—because they improve or there's an effective treatment—nothing is wasted. But meanwhile, it can open people's minds, help prevent that downward spiral, and set positive habits for later if that proves necessary. And offering ways to manage pain early is cost effective because it minimises the personal and economic costs of long term disability, unemployment, or mental health problems.

Pain management is a kind of curriculum: understanding pain; acceptance and positive thinking; relaxation and managing stress; pacing; managing medication; and safe ways to stay active. To improve access and reduce costs, the pain management advice can be delivered by nurses and physiotherapists in either primary or secondary care, with some input from past patients

### A DOCTOR'S PERSPECTIVE

Chronic pancreatitis is an unusual and unpleasant cause of persistent pain. It is described with difficulty, often as pain that is diffuse, deep inside the abdomen, and in the back. It is often worse on lying down so that sleep is interrupted. Combined with diarrhoea and constant fatigue it is easy to understand how a patient could become desperate and might plead to have the pancreas removed to abolish the pain. Healthcare professionals often assume that the patient has been an alcoholic and adopt a hardening attitude.

Our understanding of the mechanisms of persistent visceral pain is advancing rapidly. Acute pancreatitis is known to release inflammatory mediators that stimulate autonomic C fibres, transmitting a barrage of nociceptive input to the dorsal horn of the spinal cord, which responds by becoming more receptive to pain inputs, a phenomenon known as "wind-up" or central sensitisation. Previously silent NMDA (*N*-methyl-D-aspartate) receptors become active, and impulses are sent via the dorsal columns to the limbic system and higher centres of the brain. Descending facilitatory pathways from the rostral area of the brain are activated early in the process, and this may increase the perception of pain even further. For reasons that are less clear these pain pathways do not always revert to their "normal" state when the acute episode is over. Persistent pain may be related to the severity of the original illness, to ongoing sensitisation by inflammatory mediators, to altered immune responses, and to genetic factors.

As with amputation of a limb, removal of the pancreas will not remove these secondary changes in pain signalling mechanisms, and will not abolish the pain of chronic pancreatitis. For similar reasons, coeliac plexus block, successful in treating pain from pancreatic cancer, is not helpful for pain from chronic pancreatitis.

The pain from chronic pancreatitis is usually responsive to strong opioids and may also respond to agents used to treat neuropathic pain, such as gabapentin and amitriptyline. Strong opioids, morphine, oxycodone, fentanyl and buprenorphine have to be titrated to response and the dose closely monitored, preferably by a pain specialist. Apart from chronic constipation long term opioids are known to suppress the hypothalamic-pituitary axis, leading to loss of libido, altered sexual function, and in some cases suppression of cortisol levels. However, when used wisely, opioids can improve quality of life and activity levels.

Mary highlights the need for a patient with chronic pain to develop coping strategies and a sound understanding of why the pain is persistent and why it cannot be cured. She is very receptive to the principles of pain management and has applied them in a remarkable way. She has also managed to remain optimistic and leads a fulfilling, albeit different, life. Other patients take longer to do this; some never achieve this acceptance and continue to search for a cure.

**Joan Hester,** consultant in pain medicine

### POSSIBLE BARRIERS TO EFFECTIVE PAIN MANAGEMENT

Several factors may limit the effectiveness of pain management. These may be to do with the patient or the way services are offered. Every patient is different, with different views and approaches, but it's worth thinking of ways to minimise possible barriers. The following are not exhaustive or in any priority order.

**Patient barriers**

- Resistance to change
- Generally pessimistic view of life
- First language other than English
- Income problems and/or "benefit trap" (where someone receives more income from benefits than they would from employment)
- Strong expectation of a "cure" for pain
- Disability other than the disability caused by the pain
- Limited availability for pain management sessions—in terms of time, place, transport, and costs

**Health service barriers***

- Pain management sessions at the end of a patient journey rather than the start
- Long wait between the diagnosis of the medical condition causing the pain and the referral for pain management
- Long wait for the first "pain" appointment
- Medical model rather than patient partnership model
- Pain assessment tools administered by clinicians rather than the provision of tools for self assessment
- Jargon—for example, "psychological techniques" rather than "ways to manage pain"
- Lack of follow-up

*The Department of Health's new "18 week referral pathway" for pain management (www.18weeks.nhs.uk) should help to minimise these barriers

who are managing their pain effectively. Health visitors and nurses already support people with long term conditions; they can be at the heart of delivering pain management.

It may be better to offer ways to manage pain without the psychology label. People can sometimes react to the word "psychology" with resistance or distrust or be concerned that they may be seen as having a mental health problem rather than physical pain. They may feel more open to self help in nurse led or patient led groups than to a consultation with a psychologist, and they may be happy also to see physiotherapists for advice on safe exercise. Psychologists could then train facilitators and see patients with more intractable problems.

A patient centred approach doesn't undermine the clinical route. Diagnosis is still crucial, and specific treatments can still make a difference. But working in partnership right from the start with patients who take control of their own care makes things easier for clinical staff too. Then by the time a patient sees a pain consultant he or she will be informed and involved and may have more realistic expectations—especially if a "cure" may not be possible.

## Things that help

### As a patient

Lots of things make a difference to coping with persistent pain: relationships, personality, attitude to change, staying active and involved, income, and realistic expectations. I see it as a kind of luck that I'm a determined person as it helps me stay positive and build things into my life that I used to get from work: a sense of purpose and belonging; making a contribution; contact with like minded people. My income is dramatically reduced but we can manage. And my partner, Tony, has been there with the difficult job of being alongside me, being kind, and not fussing when underneath he's worried.

Persistent pain does disrupt your life. Living with pain will be a whole lot harder if you're on your own or in a strained relationship; if you're naturally pessimistic and resistant to change; if you lose your job or are trapped between benefits and low paid part time work; or if you expect a magic cure.

Doing things you love is important. I've always loved to dance and it lifts my spirits so much that the hike in pain is worth it, with a good rest afterwards to recover. And letting go helps, too. So I sometimes give in and have a private cry when the "never-endingness" of the pain needs an outlet, before I pick myself up and start again.

### As clinicians

I have good general practitioners and a good consultant. They listen. They give clear, full answers to my questions and they're open when they're thinking things through or aren't sure about something. That's incredibly important for trust. It's helpful to hear their active problem solving. It's honest and helps me to be realistic when there really isn't an answer. And it makes it feel like a shared journey, rather than being the object of their unspoken thoughts.

Doctors can make a difference when symptoms change. It's difficult to know whether changes are part of the ongoing problem or might signal something else. There's a danger of becoming scared of "what might happen" and stopping doing things, so I've had to learn to balance staying active and being sensible. I hate making a fuss and don't want to live with constant attention to how I feel, so continuity and support from doctors who know you is crucial. It can be difficult for doctors too when little can be done medically to change the impact of persistent pain.

But more than anything else, the biggest difference that clinicians and managers can make is to ensure that patients learn ways to cope with their pain as early as possible. There's no such thing as a typical patient. And yet we all need to understand our pain and learn how to cope with it. If we can learn to do that effectively, as early as possible, it helps clinicians too. The worst thing—for the patient and their family, for clinicians, for the health service, and for the economy—is to leave pain to create a downward spiral.

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## LESSON OF THE WEEK

# An underdiagnosed cause of nipple pain presented on a camera phone

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Ordinary camera phones deliver high quality photographs, which can help doctors make uncommon diagnoses

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Raynaud's phenomenon of the nipple is a possible diagnosis in lactating women with severe nipple pain. It is characterised by vasospasm of the arterioles causing intermittent ischaemia, which is manifested as pallor, followed by cyanosis as the venous blood is deoxygenated, and then erythema when reflex vasodilatation occurs. Because symptoms do not appear straight after delivery, mothers may seek the help of their GPs rather than of hospital clinicians. It is important, therefore, to educate primary healthcare workers about severe nipple pain, especially since prompt recognition and treatment allow mothers to continue breastfeeding.

### Case report

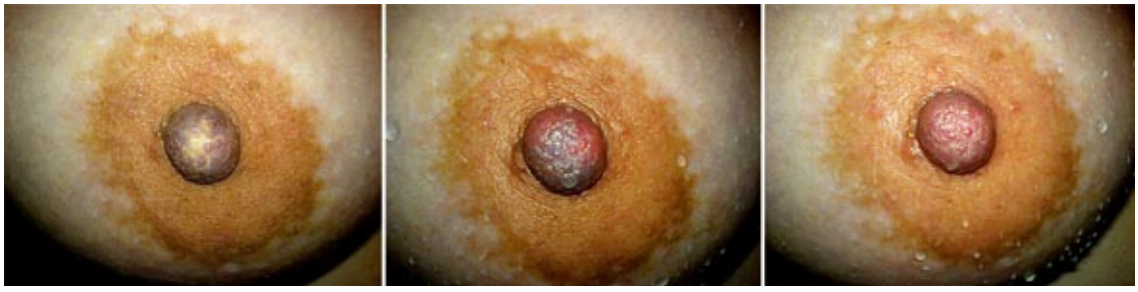
A 25 year old woman sought antenatal obstetric care early in the second trimester of her first pregnancy, reporting frequent episodes of extreme bilateral nipple pain. A typical episode lasted between 5 and 15 minutes and was so painful as to bring her to tears.

She described how the pain altered in tandem with a triphasic colour change of the nipples: first white combined with a tingling pain ("tightening a vice screw"), then blue with a burning pain ("pouring acid"), and finally a red phase combined with numbness as the pain decreased. The nipples would stay sore for some time afterwards. She presented three photographs from her camera phone depicting the colour changes of a typical episode (figure).

We suspected Raynaud's phenomenon of the nipple because of the typical triphasic colour changes and simultaneous pain characteristics.

Beside sporadic episodes of migraine, the patient had no former medical history, no known nipple trauma, no breast surgery, no family history of collagen diseases, and she was a non-smoker. She had never before taken notice of the colour changes, although she had on some occasions experienced similar nipple pain since her late adolescence. These sporadic episodes had occurred only in winter when she had been skiing. Heat would typically resolve the symptoms.

The intensity and frequency of the episodes increased dramatically during the patient's pregnancy. Fresh episodes occurred whenever her fingers, toes, or nipples became cold, as when walking barefoot or taking a



Vasospasm of the arterioles manifesting as pallor (left), followed by cyanosis, and then erythema (centre). The right hand image shows the normal, asymptomatic, status

shower. Their frequency increased from two to three episodes a week early in the second trimester to two to three episodes a day by the end of the third trimester. Symptom triggers were reduced, including minimised cold exposure (for example, wool bra pads and wool socks) and increased indoor temperature, with only a slight decrease in new episodes. In agreement with the patient, drug treatment was postponed until after she had given birth.

Surprisingly, the nipple pain resolved immediately after delivery (in gestational week 38, with birthweight at the lower end of normal at 2800 g), and she began breastfeeding during her stay on the labour ward without pain. However, in the second week after delivery, the pain gradually returned during lactation with such intensity that breastfeeding became unbearable. It was most intense in the breast that produced the most milk. A lactation consultant confirmed correct positioning and latch. Nifedipine 30 mg sustained release tablet was then initiated, with symptoms completely resolving within one week. No side effects were registered.

We made two attempts at stopping the medication 6 and 12 weeks postpartum. Both times the nipple pain returned during the following week with unbearable intensity, and the patient had to resort to using a breast pump. When nifedipine was reintroduced the pain resolved completely within a few days.

The treatment was successfully ceased one year postpartum, and the patient experienced no further symptoms. The infant continued to be breastfed up to 18 months and grew well.

## Discussion

Nipple pain is a common cause of weaning, second only to low milk production.[1] Poor positioning, or latch, is the most common cause of nipple pain.[2] Blanching of the nipple may be caused by mechanical pressure. As in this patient, additional symptoms such as biphasic or triphasic colour changes, precipitation by cold stimulus, bilateral involvement, and occurrence of symptoms when the patient is not breastfeeding should therefore be present before a diagnosis of Raynaud's phenomenon of the nipple is made. The severe pain combined with the whiteish changes of the nipple are often misinterpreted as candida, and many lactating women may be wrongly treated with repeated courses of antifungal therapy.[3]

Raynaud's phenomenon in general occurs when the ambient temperature drops below a certain threshold that is specific to each individual.[4] Exposure to cold should be avoided, and warm clothing and breastfeeding in warm environments are encouraged. Patients with Raynaud's phenomenon are usually advised to avoid medications or substances such as caffeine, nasal vasoconstrictors, and tobacco that induce vasoconstriction.[4]

Women with persistent pain require immediate relief to continue breastfeeding successfully. Recommended treatment is 30 mg nifedipine of sustained-release once-daily formulation,[4] and most women respond within two weeks.[5] To our knowledge, all women described in the literature as having received medication experienced remission of symptoms and continued to breastfeed their babies, although a second or third course was sometimes required.[3 5 6] No adverse effects on the infants were reported, and the use of nifedipine during lactation is approved both by the *British National Formulary*[7] and the American Academy of Pediatrics.[8] The primary form of Raynaud's phenomenon is related to functional alterations alone, being the most common form among women (85%).[4] Secondary Raynaud's phenomenon, which reflects structural microvascular abnormalities, has been associated with medical conditions such as connective tissue disease (for example, systemic sclerosis), drugs and toxic agents, and endocrine disorders (for example, hypothyroidism).

Increased activity of Raynaud's phenomenon during pregnancy, as in this patient, is previously described in a patient with systemic sclerosis.[9] Also in accordance with our case, Kahl et al showed that mean birth weight of babies of women with primary Raynaud's phenomenon was reduced.[10] This could represent a manifestation of systemic vasospasm.

Vasospasm of the nipple was first described in the 1970s,[11] although the association with Raynaud's phenomenon was first suggested by Coates et al in 1992.[12] Since then, only a limited number of case reports have been presented in the literature,[3 5 6 12-15] and the prevalence of the disease is unknown. The phenomenon is possibly an underdiagnosed cause of nipple pain. This could be because of GPs' lack of awareness of it, especially when mothers seek the help of their GPs rather than of hospital clinicians due to delay of symptoms after delivery, and because symptoms of a single episode have vanished before the patient reaches the GP's office.

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**Patient consent obtained.**

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