



GREEN MATERNITY CHALLENGE

SUSQI PROJECT REPORT

Reducing the impact of nausea and vomiting in pregnancy - an ambulatory approach.

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Background:

Nausea and vomiting in pregnancy (NVP) is nausea and/or vomiting in pregnancy which starts before 16 weeks gestation without any other cause. Hyperemesis gravidarum (HG) is extreme, persistent NVP which can lead to dehydration and weight loss. NVP and HG can result in maternal complications such as electrolyte abnormality, venous thromboembolism, Wernicke's encephalopathy. Fetal and childhood complications of NVP and HG include fetal growth restriction, grey matter heterotopia and neurodevelopmental problems. The maternal mental health impact is significant with suicidal ideation prevalent in 7% of those with HG. At least 5% of women with hyperemesis will have an abortion of a wanted pregnancy and around 50% will consider it.

Our unit at Norfolk and Norwich University NHS Foundation Trust (NNUHFT) is a 5,400 birth unit. 90% of women experience NVP with 4% experiencing hyperemesis gravidarum, that is approximately 215 women per year. In 2023-2024 there were a total of 460 attendances to hospital with those experiencing these symptoms, with 82 patients attending more than once accounting for over 50% of all admissions (250). From April to September 2024 the NNUH has already seen 210 admissions, with 26 patients attending more than once; this data suggests that the prevalence is underestimated.

For those with complex pregnancies & additional care needs, such as those already prescribed regular medications, HG has a disproportionately detrimental effect. Often even NVP at the milder end of the spectrum can lead to a disruption in ability to take medications and can lead to harm in

patients such as those with epilepsy, endocrine conditions or cardiac disease. This has been noted in MBRRACE reports and often causes additional anxiety and risk in already complex pregnancies. Those from minority ethnic groups and socioeconomic disadvantage also face greater challenges to access good care, as reflected in other areas of maternity. The knock on social and economic impact for these groups is also more severe. Women are often left unable to work and care for their children during pregnancy and this often has a lasting impact on employment, family dynamic and relationships.

We know that the treatment for HG and NVP is relatively simple - IV fluids, antiemetics and vitamin replacement prevent the associated complications. Ensuring that this is provided in a tailored, individualised way is essential for both physical and mental wellbeing of our service users and also for our environment. However - there are gaps in the provision of this care. The reasons for these difficulties are multifactorial.

Women often face a reluctance to be prescribed by care professionals, perhaps due to beliefs that it is “normal” to feel unwell during pregnancy (especially in the first trimester), with symptoms being minimised. Women can also experience resistance to prescribing medications from health care professionals during pregnancy and delays in receiving medication. Conflicting advice is common, potentially due to a lack of knowledge and confidence in anti-emetic prescribing at multiple levels of profession (GPs, HCAs, nurses, care assistants, family members, midwifery, consultant). The maternal, fetal and long-term risks of ongoing hyperemesis often do not feature in counselling about medication options.

We are aware from local data (service user feedback, clinical outcomes and patient testimony) that accessing timely, evidence based, effective care is challenging. This is not a challenge unique to our service. There is national evidence that women seeking support, care and medications often have to make multiple contacts with various caregivers before being offered safe and effective medication. During this time women report feeling dismissed and that their condition is minimised or said to be normal for pregnancy.

Where IV fluids and IV antiemetics are required service users often face long waits, need to attend multiple locations in the community and within hospital. Follow up is rarely arranged and access to return for care is dependent on the level of activity in the unit which means that women are not able to access the care they need. This also has an impact on the services providing care and in some cases leads to delays such as other patients waiting for emergency care or elective surgery lists where an inpatient bed is required.

Specific Aims:

To improve care for pregnant women experiencing NVP/HG. To bring together multiple streams of practice development and work with service users to develop a sustainable model for excellent care which helps to minimise the physical, psychological and social impact of HG/NVP. This will be achieved by the introduction of a virtual telephone clinic to ensure women are provided with appropriate follow up and optimisation of medications and the introduction of a virtual ward



pathway where women will be able to receive IV fluids and antiemetics at the hub or in their own homes. This will be accompanied by a multidisciplinary education programme.

Methods:

Studying the system

Staff engagement

We first implemented a survey to better understand issues from a staff perspective. We received 27 responses from a mix of specialist nurses, community and hospital midwives (number of responses in brackets).

How often do you care for pregnant women experiencing NVP/HG?

- *Every day (2) / every week (12) / more than 1 x month (5) / less than 1 x month (8)*

How confident do you feel giving advice to pregnant people with HG and NVP?

- *Confident (6) / some knowledge (12) / need update (4) / not confident (5)*

How confident would you be in discussing the risk and benefits of medication used for HG and NVP?

- *Confident (4) / some knowledge (10) / need update (6) / not confident (7)*

Staff filled out a free text box on their perceived barriers to effective care and support and their responses are outlined below:

- Referral Pathway Uncertainty
 - Appropriate referral process unclear, who to refer HG patients to? especially in early stages (before booking appointments)
 - Midwives' referrals are not always accepted by gynecological services, creating a gap in continuity of care.
- Staff training
 - Inconsistent and unreliable knowledge about HG among GPs
 - Need for updated guidelines reflecting the latest RCOG recs
 - Limited recent experience and training among midwives in HG management,
 - Specific knowledge gaps around the safety of antiemetics during the first trimester and managing persistent symptoms despite multiple medications were noted.
- Admissions
 - HG patients spend prolonged periods in MAUs (admitted after 18 weeks gestation) with incomplete or neglected fluid balance charts.
 - There is inconsistency in prescribing and administering Pabrinex
 - Unclear discharge plans, e.g. Urine ketones are commonly used as a marker for discharge, despite their unreliability in indicating proper hydration status, leading to delayed discharge decisions.

Service user feedback

We obtained feedback from women with a diagnosis of HG who had previously accessed our service. Women commented that their HG impacted on them in the following ways:

- Mental health, workplace, family/parenting, negative experience of pregnancy, diet, difficulty with daily/basic tasks
- Hospitalizations: Some women required hospital admissions due to dehydration, weakness, or inability to keep fluids down.
- Difficulty Accessing Effective Treatment: Delays in receiving care, inadequate response from healthcare providers, and limited medication options were common concerns.
- Dismissal of Symptoms: Some women felt their symptoms were not taken seriously or normalized by healthcare professionals.

23 women reported they did feel their health professional team supported them to access information and support to help with their nausea and vomiting. Positives including feeling listened to, quick access to treatment, and finding the right combination of medications which helped in avoiding further hospitalisations.

19 women reported they did not feel their health professional team supported them to access information and support to help with their nausea and vomiting. Specific issues included:

- Delayed or Inconsistent Access to Medication: some wait until 12 weeks or experiencing reluctance from GPs to prescribe stronger medications despite severe symptoms.
- Dismissive Attitudes: condition minimised to “normal pregnancy sickness.”
- Lack of Awareness Among Healthcare Providers:
 - Insufficient Communication and Coordination: Better collaboration between consultants and GPs was noted as a need for consistent care and easier prescription access.
 - Limited Support and Information: need for more comprehensive discussions of medication options, risks, and potential impacts on pregnancy, along with reassurance and emotional support.
- Inconsistent Standards of Care: Experiences varied significantly, with some receiving prompt, empathetic care, while others had to “fight” for attention and appropriate treatment.
- Women would need to attend a busy emergency gynaecology ward alongside others experiencing a variety of gynaecological emergencies to access treatment. They would require clerking at each attendance and explain their history repeatedly. Delays were often met in waiting for review and/or appropriate prescriptions as well as those incurred waiting for administration of fluids/medications.
- Long waiting times and a lack of information whilst waiting in emergency care settings. It was reported that women often were unsure where basic amenities were.
- 29 women struggled to access repeat prescriptions of medications once the initial prescription had run out.

Process map

A process mapping exercise was helpful in highlighting all the steps in the current patient journey and in understanding specific points of the journey which could be addressed, such as the experience on the gynaecology ward for both initial and subsequent attendances. It also helped

highlight the extent of the burden on the pregnant person and their family in terms of travel time and car parking.

Designing improvement and changes implemented

Information and guidance for women attending emergency care

Service user feedback highlighted attending the emergency gynaecology ward with HG as a negative experience. In conjunction with the Maternity and Neonatal Voices Partnership (MNVP) and service users we designed and implemented a laminate of written information outlining what to expect, around informed decision making about medication choices and basic amenities. This also aims to help make the visit more efficient. (Please see appendix 1)

Establishing a virtual clinic

Women discharged from the emergency ward or those referred from community midwives or GP are now offered a follow up virtual (telephone/video) appointment with fellow/resident doctor to assess efficacy of treatment and guide changes to medications. They will be followed up until stable and given contact details in case of need for further advice.

Virtual Ward Hub and IV fluids at home

The Virtual Ward at our trust facilitates early discharge from hospital by providing remote monitoring, regular virtual reviews and medication management. We have worked closely with the Virtual Ward team to design and implement a new 'Hyperemesis Pathway' to enable women with HG to be discharged from inpatient wards but still be able to access ambulatory IV treatment. This can be delivered either through attendances to the 'Virtual Ward Hub', a clinical space within the hospital, or in their own home with the Community IV nursing team. Women can be booked into the hub for planned IV treatment to avoid the long waits in ED or emergency gynaecology or have a regular visit planned in their own homes. At both home and hub visits women can have observations checked, bloods taken, cannulas inserted and urine samples tested. IV treatment is often required for HG whilst establishing an effective oral medication regime and fluid and nutritional intake. This is often started in hospital, but the Virtual Ward Hyperemesis Pathway allows this treatment to continue in the community with the aim of shortening admission length and preventing the need for readmission.

Despite an established oral treatment regime, HG symptoms can exacerbate, and women may also require fluids intermittently during early pregnancy and in some cases until term. Women admitted to Virtual Ward are provided with a monitoring kit (thermometer, pulse oximetry, BP monitor) and instructed on how to use it. They are given a smartphone device where they can upload their observations, fill out a daily questionnaire on their symptoms and highlight any other concerns. The Virtual Ward nursing and doctor team review daily with video / telephone calls to the patient and assess if any requirement for IV treatment. This pathway ensures care is more patient centred and is tailored to individual needs. There is no set regime, care is personalised and flexible. Ambulatory treatment can allow women to continue to work, look after children and maintain a better quality of life than if they remained an inpatient. The Community IV team work closely with the Virtual Ward team and provide the same IV treatment in women's homes if they are unable to attend the hospital due to transport issues, childcare commitments or other barriers preventing a hospital visit.



Education

A priority of this challenge has been to focus on ensuring women and their families receive evidence based medical advice and support informed, shared decisions at each clinical encounter. To achieve this, we have provided training sessions to multiple different health care professional groups involved in the care of women with NVP/HG focusing on up to date national guidance and the needs identified on the staff survey and service user feedback. To date we have provided education sessions to gynaecology nurses, obstetric and gynaecology doctors, community midwives, the virtual ward nursing team and the community IV nursing team. We are in the process of arranging training sessions for primary care teams, starting with regional GP trainee teaching.

Local guidelines

With the release of the updated RCOG Green Top Guidelines on The Management of Nausea and Vomiting in Pregnancy and Hyperemesis Gravidarum we have updated our local guideline to reflect the up to date guidance and also our new local services, pathways and resources available. The clinical pathways created have been approved through obstetric and gynaecology governance. Our Hyperemesis Gravidarum Virtual Ward Referral Guidance can be found in Appendix 2.

Local online resources

The service user group feedback highlighted the sparse information available to women suffering with NVP in pregnancy in early pregnancy. They commented on the missed opportunity at the point of online booking of the pregnancy to signpost for NVP support. We have redesigned the booking form to include information on NVP and have designed a page on the trust website with information, guidance and support for women experiencing NVP which is now live.

Midwifery/specialist nursing team resource

We designed a NVP/HG resource aimed at midwives in the form of double sided A5 information laminate with an aim to easily fit into the community midwife pack. We hope this provides succinct information on NVP/HG with QR codes to useful websites and will empower midwives to provide up to date, effective advice and guidance to women around medication and support available. This was designed in collaboration with midwifery teams to identify their needs from a resource. (Please see appendix 3)

Measurement:

Patient outcomes:

We acknowledge the limitations created by the timescale of this challenge in terms of collecting patient outcomes.

In the long term we will collect and review outcome data for all of those using this new service and compare to national data figures as well as attempting to make local data comparisons. We are contemporaneously collecting this data, This analysis would include the following outcomes - fetal growth restriction, number of inpatient admissions, acute complications, ability to take regular medications, need for parenteral nutrition, venous thromboembolism, abortion of wanted pregnancy, mental health outcomes including suicidal ideation.



We will include case examples for our diabetes in pregnancy service where the virtual clinic model and midwifery education model were first implemented.

Environmental sustainability:

We collected data on the

- Number and length of admissions and readmissions to emergency gynae. ward
- Number of virtual ward appointments via telephone
- Number of virtual hub admissions in person
- Medications given during inpatient stay and at virtual hub
- Consumables used for treatment (IV meds, blood tests)
- Patient travel to hospital for admissions to the gynaecology ward and to virtual hub

The carbon footprint (expressed in carbon dioxide equivalents, or CO₂e) is a common measurement used to show an environmental impact. The carbon footprint of inpatient stays on the gynaecology ward was estimated using the emissions factor for a low intensity inpatient stay (Sustainable Healthcare Coalition 2015). For the virtual hub appointment, the factor for the low intensity bed day was divided by 12 to reflect a 2 hour stay at the hub. For phone appointment an emissions factor of 0.1kg CO₂e for a 31 minute phone call as provided by the Greener NHS's business impact toolkit was applied.

The carbon footprint of IV fluids and medication was based on costs using the UK government conversion factors for SIC Codes from 2021 accounting for price inflation. The emissions factors for the consumables to administer the IV fluids and medications were taken from Rizan et al 2021 and Rosie Hillson 2024. It was assumed that on the gynaecology ward, women received 2 x 1l bags of IV fluids and 3 antiemetic medications. At the virtual hub, they would on average receive 1 x 1l bags of IV fluids and 1 antiemetic medication.

The carbon footprint of blood tests were based on Spoyalo et al's 2023 study. It was assumed that on the gynaecology ward all women have a full blood count (FBC), C-reactive protein, random blood glucose and Urea & electrolyte blood tests. Around a 3rd received an amylase, bone profile, thyroid, venous blood gases and liver function tests before the project. After the introduction of the virtual hub only around a 5th received the additional blood tests. For blood tests not included in Spoyalo et al's study the average carbon footprint of all blood tests was assumed.

For patient travel, the Health Outcomes Travel Tool was consulted for the average distance of a patient journey. It was assumed that all women travel by car of an average size with unknown fuel.

Please see Appendix 4 for a full list of emission factors used and their source.

Economic sustainability:

Costs of the below were provided by the Trust finance team.

- A day (24hours) admission to the emergency gynaecology ward: £5,584.03
- A day (24 hour) admission to virtual ward: £117
- Cost of prescribed medications: this is included in the 24 hour admission cost.



- Average costs of consumables used for treatment (IV meds, blood tests): this is included in the 24 hour admission cost.

Social sustainability:

As per methods section, a survey with women was conducted prior to the change to better understand the impacts of HG on our cohort.

As per methods section, a survey was conducted with staff prior to the change. The team plan to send a further survey once the education programme is complete, however in the meantime feedback has been received via informal methods/staff interviews - including unsolicited emails from community midwives who report enjoying applying the knowledge they have gained from teaching and using the provided resource.

Results:

Patient outcomes:

This is a service in its infancy and the team acknowledges the limitations of measuring patient outcomes without the benefit of a full pregnancy time course. In order to provide patient outcomes we have made some extrapolations and included some data from the diabetes service where we first trialled the midwifery education and virtual follow up model.

Forty-five patients have been referred to the Hyperemesis service and have been followed up in the Virtual Clinic with an average of 3 appointments per patient. Of these, 15 patients have been admitted to the Virtual Ward for monitoring, with the first patient admitted on the 13th November 2024. Thirteen of these required one or more attendances to the Virtual Ward Hub for IV treatment. Three patients have received IV treatment at home.

This model epitomises patient centred care ensuring they are listened to and care adapted to best suit them both in terms of location of care and the medication regime they receive. It enables rapid assessment, removes the need for repeated history taking and delays incurred in the need for repeat prescription. Literature supports that good, supportive care where women feel validated and listened to improves outcomes (RCOG, Fezjo).

Within the cohort of patients with diabetes we demonstrated the following patient outcomes:

- Increased glycaemic time in range due to improved ability to reliably predict and commit to eating thus giving confidence with pre bolusing insulin
- Avoiding parenteral nutrition and weight loss compared with previous pregnancy
- Reducing number of required admissions in T1DM from previous 2 pregnancies (36 to 17)
- Ability to continue prescribed medications including antiepileptic and immunosuppressant medication
- Supported to avoid termination of wanted pregnancy due to HG symptoms

Environmental sustainability:

The total carbon footprint of women attending and admitted to the gynaecology ward before the start of the project was 1,804 kgCO₂e. The majority of the emissions were due to the inpatient stay



(48%), followed by the medications and consumables to provide the IV fluids and antiemetics (30%). After the introduction of the Virtual Hub, the total GHG emissions associated with the provision of care for women suffering from HG reduced to 1,266 kgCO₂e resulting in savings of 538 kgCO₂e over a period of a month. This included a reduction in the carbon footprint of IV fluids and antiemetics from 533 kgCO₂e to 472 kgCO₂e leading to savings of 61 kgCO₂e and a decrease in GHG emissions of blood tests by 4.18 kgCO₂e.

Extrapolating the results to a whole year, GHG emissions savings of **6,461.5 kgCO₂e** could be achieved.

	Carbon footprint (kgCO ₂ e)	
	Before (Oct)	After (Dec)
Admissions at CLEY	611.71	281.22
Re-admissions to CLEY	256.20	90.20
IV fluids and antiemetics on CLEY	533.34	419.05
Blood tests on CLEY	16.42	10.89
Virtual hub phone consultation		4.50
Outpatient appointment at hub		18.95
IV fluids and antiemetics at virtual hub		53.04
Blood tests at virtual hub		1.35
Patient travel to CLEY	386.39	303.59
Patient travel to hub		82.80
Total GHG emissions	1,804.06	1,265.60
GHG emission savings (kgCO₂e)		538.46

Economic sustainability:

During October (prior to project implementation) there were a total of 22.9 bed days for hyperemesis at a cost of £127,874. In December (post implementation) there were 9.8 bed days costing £54,723 and 83 virtual ward days costing £9,711. This is more than a 50% reduction in bed costs, totaling a saving of £63,440 in the month of December. Projected across a year, assuming similar patient numbers, this service change would save £761,280.

Costs for Hartmann’s IV fluid and average costs of antiemetics reduced from £761.88 to £669.66, a saving of £62.22, or £746.64 per year. There will be additional cost savings related to medications from a reduction in consumables used to deliver IV medications.

Combined, this brings our projected annual savings to **£762,044**.

The team acknowledge that a reduction in bed days is often not recognised as a cash releasing saving, however this is significant, particularly in terms of Trust operational benefits. This change improves operational efficiency by providing ward beds and enabling elective surgical practice to take place sooner, addressing associated gynaecology waiting lists.



There may also be significant savings from reduced longer-term consequences of HG/NVP such as fetal growth restriction and psychological impacts.

Social sustainability:

The below quotes are extracted from our survey and service user groups which were co-produced/led with our local Maternity and Neonatal Voices Partnership (MNVP). The quotes before the change, followed by after, demonstrate a considerable improvement in patient centred, effective and timely care.

Before (service user):

"When my HG started I was very frightened and my mental health plummeted. It was my first pregnancy and I was scared that I wouldn't be able to continue with the pregnancy if it didn't improve, I felt so ashamed for feeling that way. I was unable to work or leave the house on bad days and had 2 hospital admissions when it was uncontrollable at home."

"I was hospitalised 5 times and often couldn't work. I was physically and mentally exhausted until symptoms let up at about 20 weeks."

"I was sacked from work due to missing so much time from sickness, my partner felt he couldn't leave me to see his friends and enjoy his own social life. As well as this I was unable to get up and about to even shower! I also became scared to eat and drink causing a massive weight loss. I was unable to do any personal care and ended up with my hair entirely matted which required specialist treatment to avoid shaving my whole head! My feelings towards pregnancy became very negative and I didn't want to get pregnant again under any circumstances even asking if I could be sterilised despite only being 21 at the time of my son's birth!"

"Had a daily impact on all my daily activities such as work, family life. I couldn't attend work, this then made me feel guilty. I felt guilty for my daughter who needed me but I couldn't act like I used to act. My husband had to help a lot more on top of his already busy work schedule. My mental health is horrendous, I cry most days, feel low and generally not excited about the pregnancy. Impact on telling people about the pregnancy because I had to because I was so unwell but also didn't want to because I felt so miserable. I couldn't clean/cook/ exercise without vomiting or fainting. Also affected my epilepsy levels too, causing added stress."

"If affected me mentally and physically, I was by the toilet all night and continued all day and I lost lots of weight and was unable to do anything, it even resulted in me having to leave my job as my sickness rate was too high but I physically couldn't go"

After service improvements (service user)

"Having IV fluids at home has meant I can participate in family life. My husband is able to go to work and my son has his mummy back"

"I have a 6 year old at home, he has a chart at home with a countdown to baby sister arriving and mummy stop being sick, I am not sure which one he is more excited about"

"One of the times I received IV fluids at home they came after school which was great, my son got to help do my obs and the nurse was great with him, and it helped him to understand the treatment and what I had been going into hospital for, it reassured him that mummy was ok."

"I am self-employed and I haven't been able to work prior to treatment. Now I do not need to attend the hospital for treatment, which can take all day. I can now work more as fluids at home only take about 2 hours."

"It is great having the fluids at home, I can rest on my own sofa. When I come into the hospital I can feel like such a burden. I have home visits booked in, I know that I am due fluids and medication as the night before I will start to be sick again"

"Thank you for doing this, in my first pregnancy I often asked if I could have treatment at home. I can't believe it is now possible, it has made such a difference"

Family/friend perspective (after):

"I have had to take time off work to take [name] to the hospital, my boss has been really understanding, but now I know that she is getting the treatment at home it is much easier."

"We also don't need to worry about school runs as we can plan IV's around this, we have had friends and family help with this before the treatment."

"Massive difference in [name], she was sick constantly before this treatment, it has been really tough. This has been such a help".

Staff perspective - from staff survey and subsequent informal feedback.

"Nausea and vomiting is hardly covered in midwifery training. Before this project we wouldn't have felt able to offer advice but now we proactively ask about it. The difference we are able to make for women with diabetes in pregnancy is huge."

"I would have offered ginger, but wouldn't have known what else to say."

"I now feel confident to not only signpost women for help but to discuss treatment options with them. The midwifery resource is an excellent tool to support care"

"We are buzzing with the difference we are able to make for patients now, we can assess and advise so that they know their treatment options before seeing the doctor ."

Discussion:

By engaging with wider staff groups and multidisciplinary team members the team have designed a hyperemesis service by successfully implementing a dedicated Virtual Hyperemesis Clinic and a Virtual Ward Hyperemesis Pathway to provide ambulatory IV treatment either via the Virtual Ward Hub and in patients own homes. During the initial rollout of the Virtual Ward service, potential issues quickly became apparent which required addressing and a redesign of the pathway. For example, Virtual Ward nursing staff escalate unwell patients to the medical doctors covering Virtual Ward who often have little to no training in the management of hyperemesis. This was addressed



by providing education and training to the Virtual Ward medical team and also reaffirming that the on-call gynecology team are available 24/7 for any advice. On one occasion a patient under the Virtual Ward service contracted influenza with a subsequent asthma exacerbation. As per pre-existing Virtual Ward protocol the patient was readmitted to the obstetric service as the parent team. This was felt to be unsafe and an inappropriate area to manage an asthma exacerbation, with doctors and midwives not familiar with up to date management. The on call medical registrar attended and the patient came to no harm but this prompted a review of the escalation pathway. It has now been agreed that if a patient under Virtual Ward was to develop a new, unrelated medical problem then they would need to be assessed in a medical area by the physicians and medically trained nurses.

There was an initial resistance to change from the gynaecology team, there was no clear reason for this but perhaps a reluctance to move away from a familiar model. The challenge team reflect that the challenges faced have added to the strength of the project so far and will likely continue to do so.

This project has demonstrated the value of working collaboratively with the virtual ward team. Prior to this, pregnant women were rarely able to benefit from the flexible, patient centred care that is facilitated by the virtual ward. We look forward to establishing more ways that we can work alongside virtual ward colleagues and develop shared pathways. Examples would be for maternal medicine patients who require enhanced monitoring such as for blood pressure or those awaiting investigations. The medical (non-maternity) team would not normally be involved in the care of women with HG, having them involved in care provision has led to another perspective on care for HG which we believe has been beneficial and challenged some of our own methods and preconceptions at times. We hope to establish a monthly MDT meeting between the virtual ward and maternity team to continue to develop the service, safeguard patients and ensure ongoing education through case based learning.

Engagement with service users has been key and the team were able to learn from their experience of the benefit of the peer support offered by the charity Pregnancy Sickness Support (PSS) and that has led to incorporation of their services into our resources (patient and clinician targeted). We were also able to interrogate the early pregnancy journey in more detail to identify common opportunities for advice which led to the prioritisation of education for community midwives. There have been some unexpected benefits noted during the course of the challenge, including the peer support observed within the service user focus groups and subsequent related thank you emails received following these. Some of our service users now aim to work with PSS themselves and one has gone on to develop a pregnancy seminar for young adults within the college that she works.

In the service's first month of inception it has demonstrated a reduction in carbon emissions and financial cost, whilst also creating a positive social impact to the patients and staff using the service. This has demonstrated the value of good, widespread education and resource provision, which has been at the heart of problem solving when we have faced challenges outlined above.



The team acknowledge that there is still much work to do to ensure that all women and their families receive supportive, evidence-based care at each contact. We will continue to roll out education, and develop resources, working with service users until this is achieved.

Conclusions:

This project has been successful in improving care options and outcomes for women with HG/NVP and we have demonstrated a reduction in repeat admissions and need for overnight stay. This has led to a significant reduction in financial costs, carbon footprint and most importantly clinical outcomes. The qualitative feedback outlining the benefits for patients of feeling supported and listened to including the reduction in financial and social impact for women and their families.

The team members believe that the success of this project has been driven by ensuring the voices of the service users and their families have remained at the centre of all developments. We were guided by initial feedback from the survey and service user groups to initiate the virtual clinic and pathways. There is also strength in the multidisciplinary nature of the core challenge team - each member (midwife, obstetrician, physician) bringing a unique perspective and offering to the wider collaborative project during the project we have ensured we have been approachable and responsive to queries and any problems faced.

The Trust intends to support the establishment and further development of this project, which has demonstrated improved cost, environmental, social and patient outcomes. The clinical pathways created have been approved through obstetric and gynaecology governance pathways and have been embedded into the new trust guidance for care of women with HG/NVP. We will audit the use of the pathway once incorporated into guidance and collect outcomes of the patients using the virtual ward/hub and clinic.

The intention is to share information around the service and resources across the Eastern region via the maternal medicine network. We believe engagement with the multidisciplinary team is essential and are continuing education on NVP/HG with further teaching sessions arranged for community midwives, specialist nurses and GP trainees. We believe this is essential and plan to engage with midwifery and GP training programmes.

As a result of engagement with the RCOG service user group and to build up on our local service user engagement we have now made a connection with PSS and intend to work with them on the patient resources we are creating as well as on national clinical toolkits.











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Appendices

Appendix 1: Information and guidance for women attending emergency care

<p style="text-align: center;">Hyperemesis Gravidarum/ Nausea and Vomiting in Pregnancy Admission to Cleve Gynaecology Emergency Department</p> <p>Welcome to Cleve Gynaecology emergency department. If you have been waiting for longer than 30 minutes before being seen by a member of staff, please notify a member of the reception team.</p> <p>You will need access to bathroom facilities and refreshments, please ask if these have not been pointed out to you.</p> <p>You will be called through to an assessment room and a nurse will ask you about information relating to your general health, pregnancy and your recent symptoms. They will also take some basic observations and some blood tests. You may be asked to go back to the waiting room following the nurse assessment.</p> <p>You will be seen by a doctor who will review all the information and discuss the treatment options with you.</p> <p>Treatment options are detailed below; this will be started either in the treatment room, waiting room or in a bay space.</p> <p>Investigations that may be performed</p> <p>Blood tests and a sample of urine will be taken to look for a urine infection that may make the sickness worse. Your blood pressure, pulse rate and body temperature will be measured. If you have not had an ultrasound scan in pregnancy, one may be arranged.</p> <p>Things your doctor may ask</p> <ul style="list-style-type: none"> • How much fluid are you able to drink per day, either in cups or mls? • Are you able to take any regular medications? • How are your symptoms affecting your day-to-day life? <p>Treatment</p> <ul style="list-style-type: none"> • Your treatment will depend on your symptoms, how much you are drinking, and any current medications that you may be taking. • The treatment will involve having a cannula placed into a vein of your arm to administer some fluids to re-hydrate. • You may also receive anti-sickness medications through the cannula, via an injection into your muscle or by oral tablet. • You may also be given a vitamin supplement (thiamine) through your intravenous cannula. • You may take fluids and a light diet as you feel able. • You may go home the same day, if your vomiting is controlled, and you are not dehydrated. 	
	<p>Advice on discharge from hospital</p> <p>You will be discharged home with oral medication to help control the nausea and vomiting. You may also be 'admitted' to the NNUH virtual ward. Some women or birthing people may require some additional monitoring and support when leaving the hospital, if this applies to you, we will provide you with the information and equipment required and will check in with you regularly from the comfort of your own home. Should further treatment be required this will then be arranged for you by the virtual ward team.</p> <p>Further advice you might find helpful:</p> <ul style="list-style-type: none"> • Get plenty of rest, we understand how physically and emotionally difficult HGV/NVP can be. • Ask for help where possible with other children, housework etc. • Ensure you eat small, frequent meals and it is advisable not to drink at the same time as you eat - it is less likely to induce vomiting if you keep fluids to thirty minutes each side of food. • Listen to your body - eat what you fancy but avoid spicy and fatty foods. Try different drinks - if you usually prefer hot drinks try cold ones and vice versa. You may find ice-lollies or ice cubes helpful to suck. • Seek further support and advice, you are not alone. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">   </div> <div style="text-align: center;">   </div> <div style="text-align: center;">   </div> <div style="text-align: center;">   </div> </div>

Appendix 2: Hyperemesis Gravidarum Virtual Ward Referral Guidance

For patients suitable for ambulatory management of Nausea and Vomiting in Pregnancy (NVP) or Hyperemesis Gravidarum (HG) consider referral to Virtual Ward. Patients on Virtual Ward can receive daily phone calls from the Virtual Ward nursing team for support and assessment. If required they can be seen in the Virtual Ward Hub for blood tests, IV fluids and IV/IM medications.

Inclusion Criteria

1. 18 years old and over
2. Persisting symptoms despite 2 or more antiemetics
3. ED attendance or hospital admission with NVP
4. Clinically stable to manage as outpatient
5. Patient consents to management on Virtual Ward
6. Patient's needs can be met by Virtual Ward
7. Care plan agreed and documented on EDL, TTOs arranged, fluids prescribed on paper chart, medication on EPMA inpatient prescription, ICE referral to virtual ward

Exclusion Criteria

1. Patient unable to take medication independently or with help of relative/carer.
2. Cognitive impairment limiting ability to use home monitoring or undertake telephone/video calls or follow an escalation pathway.
3. Patients with complex frailty requiring multi modal interventions.
4. Patient Lives alone (unless specifically agreed and low risk)

Referral Pathway

For all Virtual Ward referrals please ensure patients have had relevant investigations and other causes excluded:

- FBC, LFTs, bone profile, magnesium, U&E, CRP, TFTs, blood glucose
 - Urine dip/MSU
 - Scan requested to look for multiple pregnancy or trophoblastic disease
1. Virtual Ward referral on ICE (see *appendix 1*)
 - a. Services -> Virtual Ward (Various Pathways) -> Bespoke Referral
 - b. Named consultant – Miss Beth Laverick
 - c. Reason for Virtual Ward Referral – Hyperemesis
 - d. Additional information -
 2. ICE Electronic Discharge Letter
 - a. All patients accepted by VW need a discharge letter
 - b. Please include:
 - i. Past Medical History
 - ii. Drug history and allergies
 - iii. Instructions for Virtual Ward:
 - Next required review in the Hub for bloods/IVs
 - Initial frequency of Hub visits for bloods/IVs (*this can then be adjusted by the Virtual Ward team as appropriate*)
 - Criteria for discharge from VW
 - c. The VW team will complete the EDL on discharge from VW

3. EPMA
 - a. TTOs arranged
 - i. Oral antiemetics
 - 1st line: Cyclizine, prochlorperazine, promethazine
 - 2nd line: Metoclopramide, ondansetron, domperidone
 - Patients will likely need a combination of 2+ antiemetics to control symptoms, when up titrating add drugs as opposed to replacing them
 - There is evidence that ondansetron is safe. Its use should not be discouraged if first line antiemetics are ineffective. Women can be reassured regarding a very small increase in the absolute risk of orofacial clefting with ondansetron use in the first trimester, which should be balanced with the risks of poorly managed HG (*Please see RCOG Guidelines and UKTIS / BUMPs websites for further information*) [infographic from Irish Medicines in Pregnancy Service in Appendix 2]
 - ii. Oral PPI
 - Women should be offered treatment with proton pump inhibitors for Gastro-oesophageal reflux. The treatment of gastro-oesophageal reflux, along with anti-emetic therapy, has been associated with reduced PUQE-24 scores and improved quality of life scores
 - iii. Laxatives
 - Constipation can worsen symptoms of N+V and can be exacerbated by dehydration
 - Constipation is a well known side effect of ondansetron, all patients should be prescribed a laxative alongside ondansetron
 - iv. Consider prophylactic LMWH
 - Most women will have reduced mobility and will need discharging with 2 weeks of prophylactic LMWH if no contraindications, this can be reviewed by the service after 2 weeks
 - v. Replace thiamine (PO vs IV Pabrinex)
 - b. Appropriate IM/IV medication prescribed on Inpatient Chart for administering via the Virtual Ward Hub
 - i. IV / IM Antiemetics
 - ii. Pabrinex
 - iii. IV Omeprazole
4. IV fluids
 - a. IV fluids (Hartmanns) will need to be prescribed on a paper chart
 - b. Please keep the chart with the paper notes and a member of the VW team will collect on review
5. Referrals will be reviewed prior to discharge by a member of the VW team
 - a. For urgent referrals who need prompt review please call 5898
6. Arrange EPAU scan for patients referred to Virtual Ward for those who have not yet had a scan in pregnancy
7. Please email the patient details with a summary of the case to Hyperemesis@nnuh.nhs.uk for any patient referred to Virtual Ward and they will be followed up in Hyperemesis Clinic.

Appendix 1 of referral guideline: ICE Virtual Ward Referral for Hyperemesis Patients

Laboratory Medicine | Microbiology | Blood Transfusion | Breast Imaging | Cellular Pathology | Nuclear Medicine | Radiology Modalities | Radiology IRL

Services A - I
Services J - Q
Services R - Z
Radiology
Conditions and Diseases
Search

Set as Default Panel

- Respiratory Nurse Specialist (COPD)
- Speech and Language Therapy
- Stoma Care Nurses
- Specialist Palliative Care Team
- Substance Misuse Nurses
- Skin Cancer CNS
- Respiratory Laboratory Testing
- Referral Outpatient Short Synacthen Test
- Thyroid Teleclinic Referral
- Trauma Team Referral
- Spine MDT Referral
- Suspected COVID Case
- Suspected Infectious Diarrhoea
- Stroke Rehab Early Supported Discharge
- Tissue viability Specialist Nurse
- Thoracic Surgical Specialist Nurse
- Upper GI Cancer Nurse Specialist Team
- Upper GI MDT Referral
- Vascular Treadmill
- Virtual Ward (Various Pathway)
- Wig's Service
- Spinal Cord Injury Team Nurse
- Respiratory Opinion

Laboratory Medicine | Microbiology | Blood Transfusion | Breast Imaging | Cellular Pathology | Nuclear Medicine | Radiology Modalities | Radiology IRL

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- Upper GI Cancer Nurse Specialist Team
- Upper GI MDT Referral
- Vascular Treadmill

Request Options-- Web page Dialogue

Virtual Ward (Various Pathway)

Please choose the pathway you require

- Covid Pulse Oximetry ED
- Hot Gall Bladder Pathway
- Oxygen Weaning
- Nebuliser weaning
- Blood monitoring
- Intravenous Therapy
- Awaiting Papworth
- Awaiting Diagnostics
- Respiratory Referral**

OK

Laboratory Medicine | Microbiology | Blood Transfusion | Breast Imaging | Cellular Pathology | Nuclear Medicine | Radiology Modalities | Radiology IRL

Services A - I
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Set as Default Panel

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- Thoracic Surgical Specialist Nurse
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- Upper GI MDT Referral
- Vascular Treadmill

Request Options-- Web page Dialogue

SPVW - Bespoke panel

Referring Consultant

Miss Laverick

Reason for Virtual Ward referral

Hyperemesis

Is the patient/carer able to administer medications?

Yes No

Additional information

OK



Appendix 2 of referral guideline: Visual risk summary infographic from Irish Medicines in Pregnancy Service

Visual risk summary

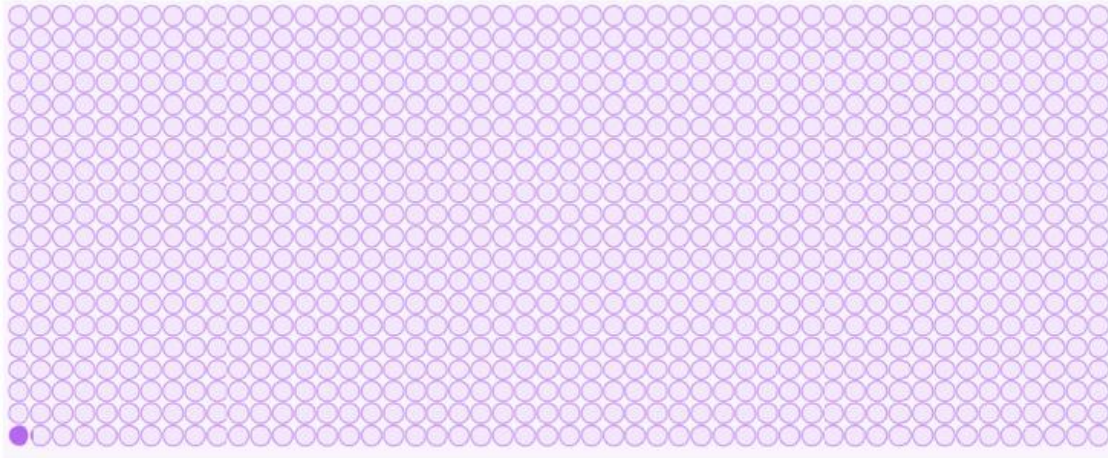


Figure 1. Rate of orofacial clefts in non-exposed pregnancies- 11 per 10,000

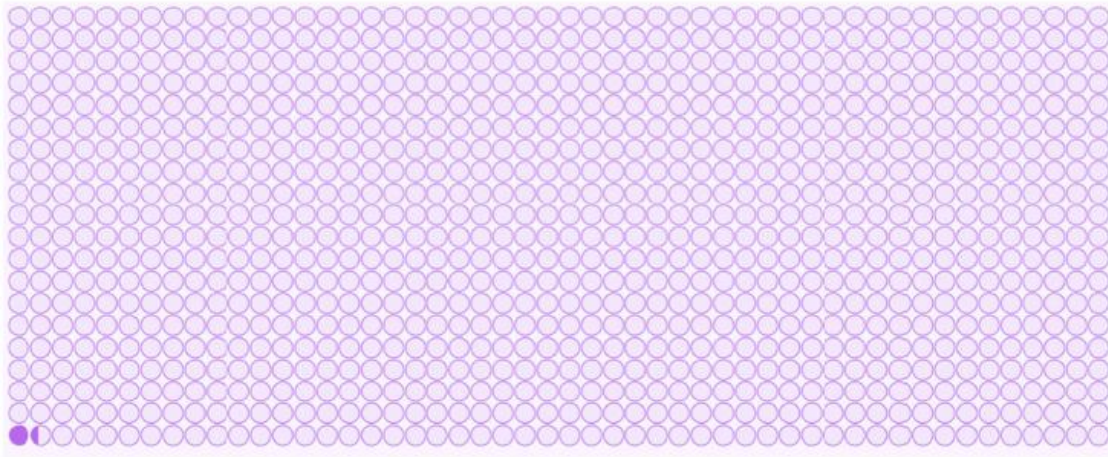


Figure 2. Rate of orofacial clefts in ondansetron-exposed pregnancies- 14 per 10,000

Appendix 3: HG and NVP resource for community midwives and maternity staff

NAUSEA AND VOMITING IN PREGNANCY (NVP) AND HYPEREMESIS GRAVIDARUM (HG)

NVP is defined as the symptom of nausea and/or vomiting during pregnancy when onset is prior to 20 weeks of gestation and where there are no other causes. HG is a severe form of NVP which interferes with quality of life and ability to eat and drink.

NVP/HG is associated with serious health consequences for both mother and baby. One of the issues many women face is lack of understanding, and that exacerbates an already isolating experience.

ASSESSMENT OF NVP / HG

Other conditions may cause nausea and vomiting in pregnancy, and this may be the case if associated with:

- Urinary symptoms
- Intestine symptoms
- Abdominal pain
- Medication use e.g. oral iron

MANAGEMENT OF NVP / HG

Severe different anti-emetics are available, written forms of these medicines may not be licensed for use in pregnancy, they can be considered safe for mum and baby. Check a combination of two, three or four antiemetics are required to control symptoms.

Safe and commonly used antiemetic:

1st line

- Cyclizine
- Prochlorperazine

2nd line

- Metoclopramide
- Ondansetron

ACID REFLUX
NVP can exacerbate symptoms of reflux and a PPI e.g. omeprazole is safe to take in pregnancy.

THROMBOPROPHYLAXIS
Women with NVP / HG are at high risk of VTE. Hydration, reduced mobility and dehydration all increase the risk of VTE. A score is used to assess the risk.

CONSTIPATION
Symptoms of NVP can be exacerbated by constipation and women may benefit from a bulking agent. Constipation is well known to cause constipation.

NUTRITION
Hyperemesis with oral intake should be considered if severely reduced dietary intake. Women are unlikely to tolerate oral iron therefore IV replacement is often preferable.

PREGNANCY-UNIQUE QUANTIFICATION OF EMESIS (PUQE) SCORE

The PUQE score can be used to determine whether the NVP is mild, moderate or severe. The PUQE score can also be used to assess the response to treatment for mild to moderate NVP but is not valid for severe NVP and HG.

Choose the option that best describes your symptoms on your worst day of NVP

In the last 24 hours, for how long have you felt nauseated or sick to your stomach?				
1	2	3	4	5
Not at all	1 hour or less	2 to 3 hours	4 to 5 hours	6 to 8 hours

In the last 24 hours, how many times have you vomited or thrown up?				
1	2	3	4	5
1 to 2 times	3 to 4 times	5 to 6 times	7 times or more	

In the last 24 hours, how many times have you had retching or dry heaves without throwing up?

1	2	3	4	5
None	1 to 2 times	3 or 4 times	5 to 6 times	7 times or more

Level 1 - 6 - Mild NVP should be managed in the community with oral antiemetics

Moderate 7 - 12 - Fluid intake will help guide where these patients should be managed







Severe >12 - A score of 13 or more has been used as a criterion for admission to hospital/ambulatory care (also see HIGH RISK PATIENTS section onward)


"I was told vomiting was a sign of a healthy pregnancy and was told to 'ride it out'"

"Did you know?" It is no longer recommended to use vitamin B6 as a treatment of severity.

"That everyone was excited for my baby but no one was concerned about me"

8 symptoms aren't controlled with two or more antiemetics in primary care then further advice can be sought from: hypemesis@nuth.nhs.uk



Norfolk and Norwich University Hospital
Maternity

Appendix 4: Emission factors and source.

Activity data	Unit	EF (kgCO ₂ e/unit)	Source
Low intensity bed day	bed day	37.9	Sustainable Healthcare Coalition 2015
Outpatient appointment	OPA/hour	1.58	Sustainable Healthcare Coalition 2015
Phone consultation	31 min	0.10	Greener NHS 2022
Pharmaceuticals	£	0.58	DEFRA carbon conversion factors for SIC Codes
Medical instruments	£	0.62	DEFRA carbon conversion factors for SIC Codes
Averaged size car with unknown fuel	mile	0.34	DESNZ
Phlebotomy	process	0.15	Spoyalo K et al. 2023
Vial for FBC (purple)	vial	0.03	Spoyalo K et al. 2023
Vial for Urea and electrolytes	vial	0.03	Spoyalo K et al. 2023
FBC blood test	test	0.002	Spoyalo K et al. 2023
Urea & electrolytes blood test	test	0.04	Spoyalo K et al. 2023
Liver panel blood test	test	0.46	Spoyalo K et al. 2023
Bone profile (Mg, Ca, P)	test	0.078	Spoyalo K et al. 2023
Amylase	test	0.041	Spoyalo K et al. 2023
Total protein	test	0.04	Spoyalo K et al. 2023
Vial total protein (gold)	vial	0.03	Spoyalo K et al. 2023
Avg of all blood tests	test	0.04	Spoyalo K et al. 2023
Gloves	pair	0.052	Rizan et al. 2021
Clinell wipe	item	0.021	Rizan 2021
Green needle	item	0.017	Hillson 2024
Orange needle	item	0.025	Hillson 2024
10ml syringe	item	0.033	Hillson 2024
Giving set	item	0.200	Hillson 2024
20G b braun cannula	item	0.052	Hillson 2024
18G b braun cannula	item	0.052	Hillson 2024