Norfolk and Norwich University Hospitals NHS Foundation Trust

A Clinical Guideline for the Management of Varicella-Zoster (VZV) Infections to prevent nosocomial Transmission to at-risk individuals

For Use In	All areas within the Norfolk and Norwich University Hospitals NHS Foundation Trust (NNUH)
By:	All Trust Staff
For:	Prevention of nosocomial transmission of VZV to at-risk individuals
Division responsible for document:	Clinical Support Services
Key words:	Chickenpox, Shingles, VZV, Varicella-Zoster virus, VZIG
Name of document author:	Dr Samir Dervisevic
Job title of document author:	Consultant Virologist
Supported by:	Dr Catherine Tremlett – Infection Control Doctor Infection Prevention & Control Team
Assessed and approved by the:	Hospital Infection Control Committee (HICC) February 2014…
Date of approval:	November 2020
Ratified by or reported as approved to (if applicable)**:**	Clinical Guideline Assessment Panel (CGAP)
To be reviewed before: This document remains current after this date but will be under review	November 2023
To be reviewed by:	Consultant Virologist
Reference and / or Trust Docs ID No:	634
Version No:	2.2
Description of changes:	Review
Compliance links: *(is there any NICE related to guidance)*	CQC Fundamental Standards - Regulation: 12 and 15
If Yes - does the strategy/policy deviate from the recommendations of NICE? If so why?	

A Clinical Guideline for the Management of Varicella-Zoster (VZV) Infections to prevent nosocomial Transmission to at-risk individuals

Version and Document Control:

Version Number	Date of Update	Change Description	Author
2.2	November	Reviewed minor change	Dr Samir Dervisevic

This is a Controlled Document

Printed copies of this document may not be up to date. Please check the hospital intranet for the latest version and destroy all previous versions.

1. Contents page

2. Definitions of Terms Used

Definition of significant exposure for VZV: -

Type of VZV infection in the index case: i.e.

- Chickenpox
- Shingles at any site in an immunocompromised patient
- Shingles on an exposed body part in an immunocompetent patient

Infectious period duration:

- Chickenpox - 48 hours before onset of rash until it has crusted over
- Shingles - On day of onset of rash until lesions have crusted over

Closeness and duration of contact:-

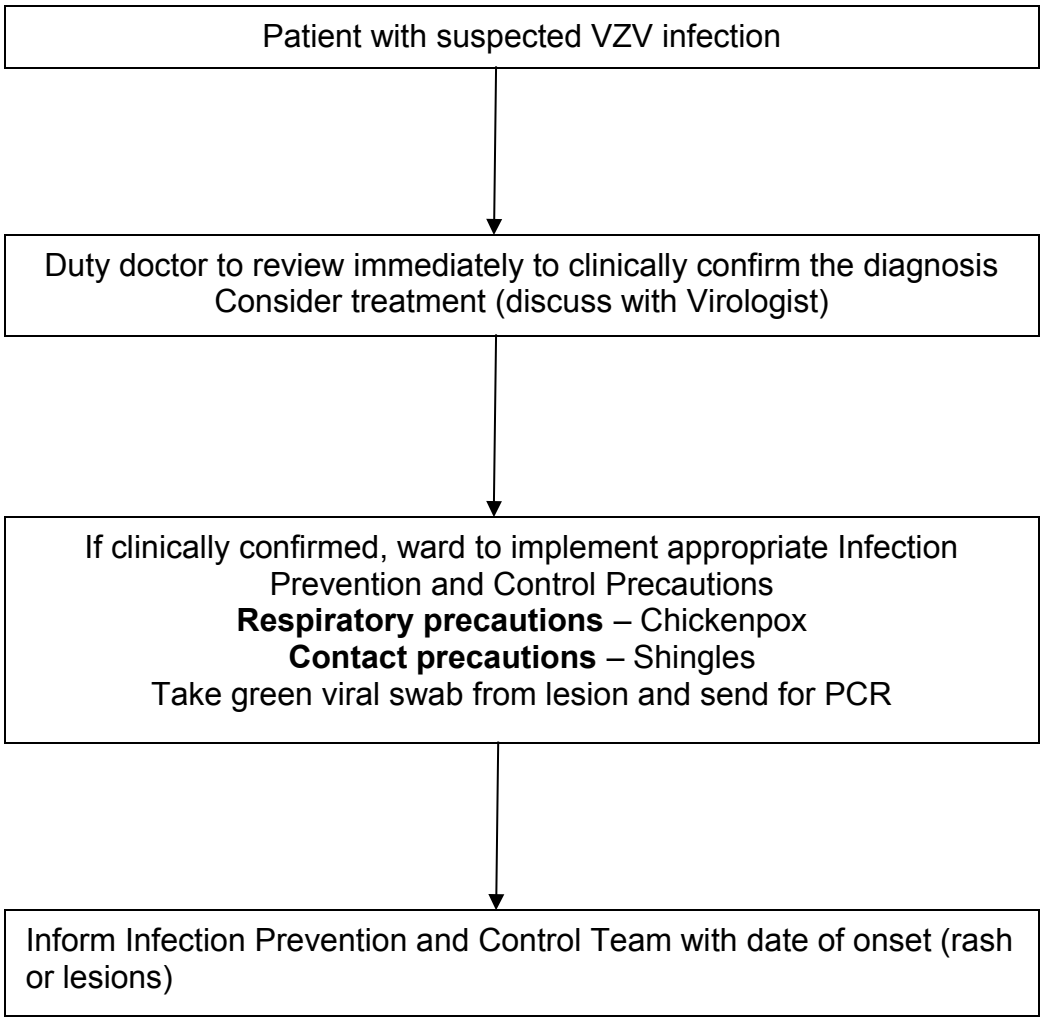
- Same room for >15 minutes
- Face to face conversation
- Immunocompromised patients on large open wards, especially in paediatrics where the degree of contact can be difficult to determine

3. Quick reference

Links to Quick Reference Flowcharts and Documents Some of these documents can be printed and displayed for information To open link hold the Ctrl button on your keyboard and click the link with your mouse.
Patient VZV contact list for chickenpox/shingles
Chickenpox Patient Information Leaflet
Shingles Patient Information Leaflet
Associated Documents: Policy and Guideline Links
Bagging procedure for linen and laundry
Cleaning & Disinfection of Hospitals
Hand Hygiene
Waste Management Policy
Contact Isolation Poster
Respiratory Isolation Poster

Algorithm 1

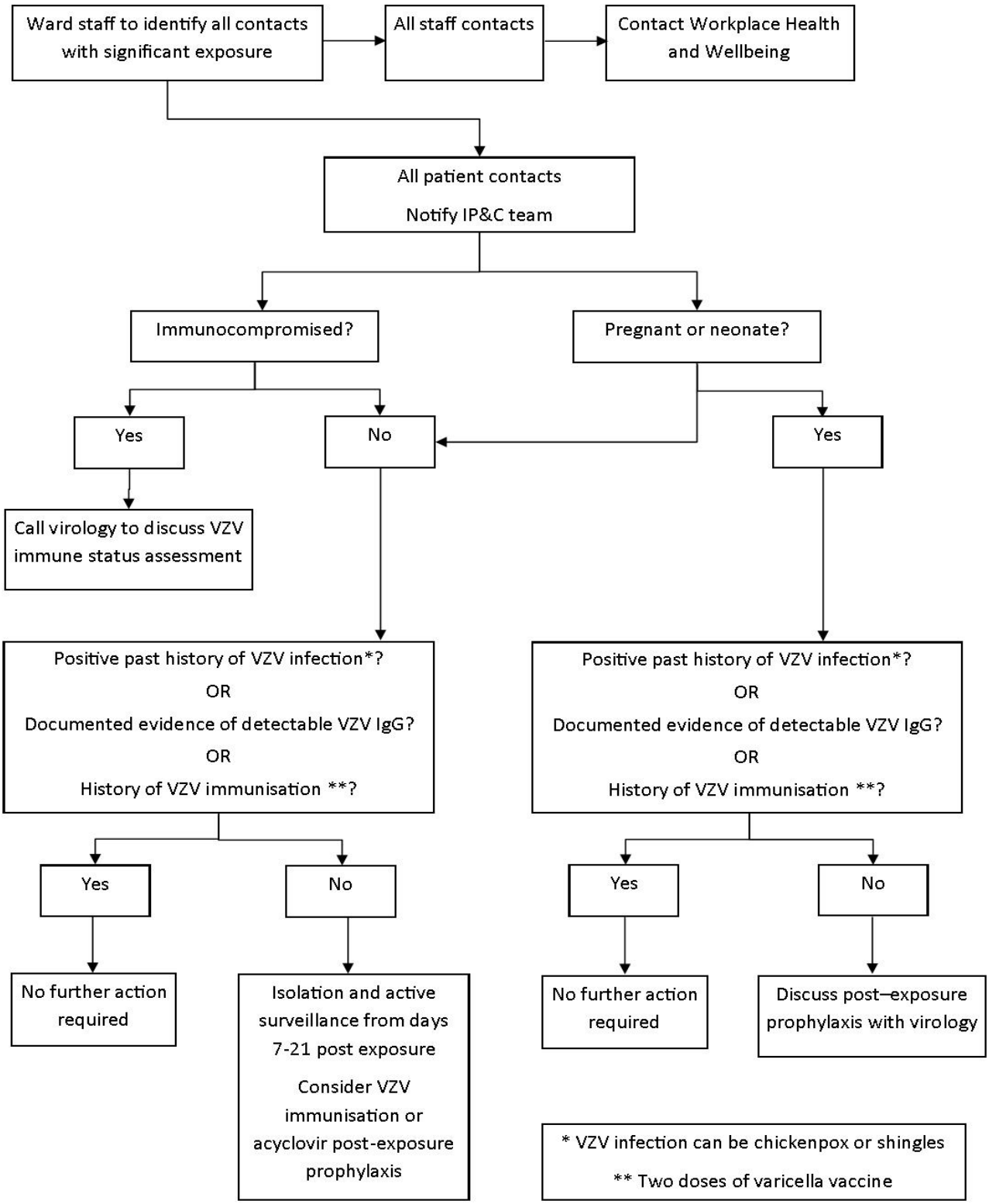
Management of patients suspected to have Chickenpox or Shingles (VZV infection)



A Clinical Guideline for the Management of Varicella-Zoster (VZV) Infections to prevent nosocomial Transmission to at-risk individuals

Algorithm 2

Management of contacts with significant exposure



4. Objectives

The purpose of this guideline is to guide Infection Prevention and Control (IP&C) activities in order to prevent nosocomial transmission to patients, staff and visitors.

4.1 Staff Groups

Chief Executive has overall responsibility for ensuring there are effective procedures and resources in place to enable the implementation of this guideline.

DIPC is responsible for the development and implementation of strategies and policies on IP&C.

IP&C Team (IP&CT)

- To provide advice and support with regards to the management of patients requiring isolation
- Assist in monitoring the guideline
- Provide appropriate IP&C training to trust staff

Virology to alert the IP&CT and clinical teams of patient result that may have infection control implications; and provide help and advice for clinical staff.

Divisional Managers, Operational Directors and Clinical Directors to ensure this guideline is disseminated and implemented within areas of responsibility and see that the staff responsible has the ability and support.

Ward and departmental managers/Matron

- Ensure all staff in areas of responsibility are aware of and comply with the guideline
- To ensure that staff are up to date with mandatory IP&C training
- Facilitate isolation of patients with potential/known infections as soon as possible
- Assist in monitoring the guideline
- Ensure daily review of patients continuing need for isolation daily in order to free up single rooms that are no longer required for isolation purposes

Estates are responsible for ongoing maintenance of ventilation systems and general environment of the isolation room.

Service Provider for cleaning to ensure all areas are cleaned accordingly to the agreed standard.

Workplace health and wellbeing to alert IP&CT to any infection issue amongst trust employees that may have an impact on patients. They will record the VZV status of staff. To liaise with areas on staff contact tracing as required.

Operations Centre Team to facilitate isolation of patients with potential/known infections as soon as possible.

All staff as relevant

- To abide by the information provided in these guidelines
- To ensure they are up to date with mandatory IP&C training
- Daily review of patients continuing need for isolation in order to free up single rooms that are no longer required for isolation purposes
- Keep the patient informed of their infection status regularly as necessary

It is the responsibility of each employee to be aware of the procedural documents which relate to their department/area of practice.

5. Rationale

5.1 Chickenpox

Chickenpox is an acute (primary) infection caused by the varicella-zoster virus (VZV) and is predominantly an infection of childhood. In adults, it may begin with a flu-like illness for 1-2 days before onset of the rash. In children, the first symptom is very often the rash. Skin lesions develop in crops and progress from macules through papules and vesicles to scabs over 3-5 days. This can be longer in those who are immunocompromised. Chickenpox is highly contagious infecting up to 90% of non-immune people who are exposed to the virus. The virus can be isolated from vesicle fluid and the base of fresh lesions. To confirm the diagnosis in the index case, if in doubt, medical staff should contact the duty virologist on ext. 4531 or out of hours via the Norfolk & Norwich University Hospital NHS Foundation Trust (NNUH) switchboard on 01603 286286.

Chickenpox is usually benign in immunocompetent children but may be severe in adults, pregnancy, neonates and in the immunocompromised.

Incubation period – generally between 10 - 21 days, but usually 14 days. Administration of Varicella Zoster Immunoglobulin (VZIG) can prolong incubation period to 28 days.

Infectivity - usually 48 hours before onset of the rash until crusting over of lesions.

To calculate the limits of potential infectivity in a worst-case scenario following a contact:

- Earliest date of contact + 7 days = onset of potential 48 hour window of infectivity.
- Last date of contact + 21 days = loss of infectivity provided there is no evidence of infection.

Isolation - person to person transmission occurs by direct contact, droplet and airborne spread of secretions from the respiratory tract or vesicles. The virus can be spread indirectly on hands and inanimate objects. Respiratory isolation procedures are required i.e. single room with use of gloves, aprons, masks and attention to hand hygiene to prevent infection of non-immune staff and susceptible patients. Patients with chickenpox should be cared for by immune staff only.

Treatment - There is no role for VZIG in the management of acute cases of chickenpox.

Use of high dose acyclovir should be considered early in infection for adults and immunocompromised patients.

Surveillance – Chickenpox is not a notifiable disease in England and Wales; therefore there is no requirement to inform Public Health however the IP&CT must be notified of any clinically suspected or confirmed cases.

5.2 Shingles

Shingles is due to the reactivation of latent VZV in the cells supplying sensory nerve fibres of 1 or 2 dermatomes unilaterally. It can occur at any age but is most common in those over 50 years. The disease often begins with paraesthesia in the involved dermatome for 2-3 days.

Erythematous maculopapular lesions develop which rapidly evolve into vesicles and may coalesce to form bullae.

Shingles is less contagious (there is no infectious incubation period) as the virus is confined to a rash which can be covered in most cases. Non immune patients are at risk of contracting chickenpox from patients with shingles

Those who have had chickenpox who come into contact with a person with shingles are not at risk of acquiring the disease as they will be immune.

Shingles may be severe in the immunocompromised patient and can occasionally become disseminated with visceral involvement.

Infectivity – from onset of rash until crusting of lesions although immunocompromised patients may be infectious for longer.

Isolation – person to person transmission is via direct contact with the rash or from spread of secretions from the rash to non-immune persons. Contact isolation procedures are required i.e. single room with use of gloves and apron and attention to hand hygiene to prevent infection of non-immune staff and transfer of virus to susceptible patients.

Treatment – If required is with either oral or intravenous acyclovir depending on disease severity and underlying health conditions.

Surveillance – Shingles is not a notifiable disease in England and Wales; therefore no requirement to inform Public Health. However the IP&CT must be notified of any clinically suspected or confirmed cases.

5.3 Patient at risk groups

VZV is highly contagious and over 90% of the general population have serological evidence of past infection. Most adults are immune and the risk of transmission is highest in children. **Infection control activities primarily are targeted to prevent nosocomial transmission to non-immune immunocompromised patients, pregnant women and neonates, including but not exclusively limited to the following patient groups:-**

- Patients with leukaemia and other haematological and non-haematological malignancies
- All patients who have received a solid organ transplant and are currently on immunosuppressive treatment
- Patients with AIDS
- Patients who have received a bone marrow transplant until at least 12 months after finishing all immunosuppressive treatment, or longer where the patient has developed graft-versus-host disease.
- All patients receiving systemic high-dose steroids until at least three months after treatment has stopped. This would include children who receive prednisolone, orally or rectally, at a daily dose (or its equivalent) of 2mg/kg/day for at least one week, or 1mg/kg/day for one month. For adults, an equivalent dose is harder to define but immunosuppression should be considered in those who receive 40mg of prednisolone per day for more than one week
- All patients currently being treated for malignant disease with immunosuppressive chemotherapy or radiotherapy, and for at least six months after completing or terminating such treatment.
- Neonates, to include infants born at less than 28 weeks gestation or who weigh <1000grams regardless of maternal immune status
- Pregnant non-immune women (regardless of stage of pregnancy)

Healthcare staff

The VZV status of all staff that work with immunocompromised patients or in paediatrics, obstetrics or in the Neonatal Intensive Care Unit must be established. Non-immune staff should be immunised and will be given priority by Workplace Health and Wellbeing. Temporary restriction from patient contact may be necessary in certain cases and ward managers will be informed of the VZV status of staff as required.

6. Processes to be followed

6.1 Management of Patients with Varicella-Zoster Infection

In the event of an infection with VZV occurring in hospital the following actions **must** be taken: -

- Patients with VZV infection must be isolated immediately in single rooms with closed doors and with no contact with persons without evidence of immunity, this must include visitors and healthcare workers
- Suspicion of VZV infection should be confirmed by sending a green viral swab of a lesion(s) for PCR.
- Respiratory precautions (chickenpox) and contact precautions (shingles) must be adhered to until all lesions are dry and crusted
- A member of the IP&CT **must** be informed by the medical or nursing staff involved. IP&C Nurses are contactable on ext. 5847 or via Bleep 0600, after 17.00, and via the hospital switchboard on weekends and bank holidays. The duty IP&C nurse is contactable via the NNUH switchboard. Alternatively contact the Duty Virologist in Microbiology Department on 01603 288587/288531 or via the NNUH switchboard
- If the suspected VZV case is a staff member, Workplace Health and Wellbeing must be informed by staff on the ward on ext. 3035. IP&C will also need to be informed if there has been contact with patients

Isolation

- The patient must be nursed in a side room with designated toilet facilities
- Respiratory (chickenpox) and contact (shingles) precautions posters applied
- Patients do not need to be nursed in negative pressure rooms
- The patient should be isolated until all the skin lesions are crusted which is usually about four to seven days after the appearance of the rash
- Offer patient chickenpox/shingles information leaflet (see quick reference)
- Non immune patients who have been exposed to the patient with Varicella Zoster infection and who are still in hospital should be isolated from 7 days following their

first exposure until 21 days after their last exposure. This period is extended by 7 days if post-exposure prophylaxis is given because this can prolong the incubation period.

Personnel Protective Equipment (PPE)

- During the period of isolation, appropriate PPE must be worn for direct patient contact reflecting respiratory or contact precautions as required.
- Hands must be decontaminated after the removal of gloves. Strict compliance with hand washing techniques must be observed at all times. See Hand Hygiene policy in the IP&C Manual.
- Eye protection should be considered dependent on the care activity being performed.

Disposal of clinical waste

- All waste from the room should be disposed of as clinical waste for the duration that the patient is in isolation. Waste Management Policy

Cutlery/Crockery

- Normal ward issue can be used but must be cleaned by washing in a dishwasher

Linen

- All linen must be disposed of as 'infected' linen and be placed into a red alginate (water soluble) bag before being placed into a white plastic bag. See Bagging procedure for linen and laundry in the IP&C Manual

Cleaning

- The patient environment must be cleaned as per the Cleaning & Disinfection of Hospitals policy

Theatre Cases

- Inform theatre
- Place patient at end of theatre list
- All staff in contact with the patient should be known to have immunity to VZV
- In cases of shingles, area affected must be covered by clothing or if lesions weeping covered with a dressing where possible.
- Patient should be taken straight into theatre
- The patient should be recovered in theatre

Visits to other departments

- Kept to a minimum
- Need for isolation should never jeopardise clinical need
- No waiting in communal areas

Visitors

- Informed of risk by ward staff
- Seek evidence of VZV immunity by verbal confirmation
- To use PPE for patient contact if VZV immunity not known

- If non-immune to discourage from visiting

6.2 Management of a VZV Incident - (see Algorithm 1)

When a VZV infection is suspected/confirmed in a patient, ward staff must inform IP&C immediately.

Chickenpox

The IP&CT will check PAS for patient bed movements during the 48 hours before rash onset to identify potentially exposed patients.

Ward staff are responsible for providing a list of patients with significant contact with the index case (Patient VZV contact list). Include all areas the index case may have visited. All patients and staff known to have had significant contact with the index case must be included in the contact list. This list must be sent to the IP&CT within 24 hours of the case being identified.

Shingles

The IP&CT will check PAS for patient bed movements from the date of onset of rash, to identify potentially exposed patients.

Ward staff are responsible for providing a list of patients with significant contact with the index case. Include all areas the index case may have visited. All patients and staff known to have had significant contact with the index case are included in the contact list. This list must be sent to the IP&CT within 24 hours of the case being identified.

6.3 Patient related investigation (Contact Tracing)

Patients with significant contact are classified based on whether they fall into a high risk category (immunocompromised, pregnant, or neonate) and on whether they have a past history of VZV infection/immunisation (chickenpox or shingles) or not.

Immunocompetent patients with a positive history VZV infection

- No further action.

Immunocompetent patients with no history of VZV infection

- Take clotted blood for VZV serology. Include on request form whether patient has been given blood products recently.
- If the patient cannot be discharged, he/she must be isolated from 7 days after first contact until 21 days after last contact. If VZV serology shows immunity, isolation should be discontinued.
- Discuss with virology the use of prophylactic acyclovir or VZV immunisation in non-immune adult patients with a significant exposure, even if they are not immunocompromised or pregnant.

Immunocompromised contacts, pregnant women and neonates

- An assessment of VZV immune status is required- this should be done in conjunction with virology. The assessment requires enquiring about past history of VZV infection (chickenpox and shingles) and previous VZV immunisation.
- For some individuals a blood test for VZV IgG antibodies will be required. Include on request form whether patient has been given VZIG or blood products recently. Booking bloods from pregnant women may be stored in the microbiology laboratory thus negating the need for venepuncture.
- The duty virologist will advise on the need for post-exposure prophylaxis (further detail in section 6.5).
- If the patient is shown serologically to be immune isolation is not required. If found to be non-immune, isolate the patient before they potentially become infectious, which can be as soon as 7 days after contact, until 21 days after last exposure if still in hospital. Note that this period of isolation needs to be increased if post-exposure prophylaxis is given.
- If a rash develops take a green viral swab for PCR and contact virology and the IP&C team.

6.4 Staff related investigation (Contact Tracing)

A history of VZV infection or serological status must be sought from all exposed staff if not already available and referred to Workplace Health and Wellbeing.

6.5 VZV Post-exposure prophylaxis

Varicella Zoster Immunoglobulin (VZIG)

Dosage

0-5 years	250mg
6-10 years	500mg
11-14 years	750mg
15+ years	1000mg

Given by slow intramuscular injection: The upper outer quadrant of the buttock or anterolateral thigh is the preferred location. VZIG is issued in vials of 250mg by Pharmacy in conjunction with Virology (telephone ext. 4531 or 01603 288587 and ask to speak to a duty Virologist. Out of hours please contact the on-call Consultant Virologist via the NNUH switchboard).

Timing

VZIG attenuates infection only if given within 10 days of contact.

If a second exposure occurs more than 3 weeks after a dose of VZIG, reassessment for a potential second dose is required as the protection offered is only temporary.

Usage

VZIG is generally indicated if VZV post-exposure prophylaxis is required for; neonates, and women in the first 20 weeks of pregnancy.

Acyclovir

Dosage for prophylaxis

Children <2 years old	10mg/kg, 4 times a day
Children 2-17 years of age	10mg/kg (to a max. of 800mg), 4 times a day
Adults	800mg, 4 times a day

Timing

Oral acyclovir in the above doses should be given from days 7 to 14 after the exposure. For individuals identified more than 7 days post exposure, a course of acyclovir can be considered up to day 14 post exposure. If a second exposure to VZV occurs once the acyclovir course has been completed, reassessment should occur as a repeat course may be required.

Contraindications

For individuals with renal impairment or intestinal malabsorption, VZIG may be considered instead of acyclovir.

Usage

Acyclovir is used for VZV post-exposure prophylaxis in immunocompromised patients

Immunocompromised Patients

- There is a Public Health Guideline to assess the degree of immune compromise and whether or not a history of previous VZV infection is acceptable evidence of immunity to VZV. This should be consulted by calling virology, who will advise whether the patient can be considered immune based on history alone, or if VZV serology is required.
- Immunocompromised patients exposed to VZV and found to be serologically non-immune should be offered post-exposure prophylaxis with acyclovir (assuming no contraindications).
- Immunocompromised patients assessed to be immune (either through history or, if required, serology) do not require post-exposure prophylaxis following an exposure.
- Examples of immunocompromised to consider are;

    - Patients with evidence of impaired cellular immunity e.g. Di George Syndrome
    - Patients currently being treated with chemotherapy or generalised radiotherapy, or within 6 months of treatment completion

- Patients who have received an organ transplant and are on immunosuppressive treatment
- Patients with a lymphoproliferative disorder who continue to be followed up
- Patients who have had a haematopoietic stem cell transplant
- Those currently on (or having received in the last 3 months) high dose systemic steroids
- HIV positive individuals with a CD4 count less than 200
- Any patient on an immunosuppressive therapy such as (but not limited to)- biologic therapies, methotrexate, azathioprine, iclosporin, mercaptopurine and cyclophosphamide

Neonates

- Neonates exposed to VZV should be discussed with virology to determine whether testing of the neonate or their mother is required to establish evidence of immunity
- VZV post-exposure prophylaxis for neonates is with VZIG. Situations in which this is indicated include;
  - Neonates, whose mothers have developed chickenpox (not shingles) in the period 7 days before to 7 days after delivery.
  - Neonates 7 days old or less in contact with chickenpox or shingles whose mothers have no history of chickenpox and have no antibody.
  - VZV IgG negative infants in the first year of life, exposed to chickenpox or shingles whilst still undergoing prolonged or intensive special care nursing.
  - VZV IgG negative infants under 1 year old who have remained in hospital since birth and were born before 28 weeks gestation, or who weighed less than 1000g at birth.
- For very high risk exposures, acyclovir may be required in addition to VZIG- discuss with virology

Pregnant Women

- Immunocompetent pregnant women with a clear history of previous VZV infection (chickenpox or shingles) or immunisation (two doses of varicella vaccine) should be considered immune and no further action is required following a contact
- Pregnant women without such a history should be tested for VZV IgG- on the booking blood if available.
- For pregnant women found to be VZV IgG not detected, post-exposure prophylaxis is indicated at all stages of pregnancy.
- If the exposure occurred in the first 20 weeks of pregnancy, prophylaxis with VZIG should be offered.
- For exposures occurring after 20 weeks of pregnancy, either VZIG or acyclovir can be used as prophylaxis, taking into account patient and health care professional preference, and the ability to provide prophylaxis in a timely fashion.

7. Clinical audit standards/audit standards/monitoring compliance

To ensure that practice is compliant with the above standards, the following monitoring processes will be undertaken;

- Retrospective review of records of patients diagnosed with VZV infections to audit compliance with isolation guidelines, and use of post-exposure prophylaxis. This will be done before the policy is reviewed at three years jointly between virology and IP&C departments.

The audit results will be sent to the ICD and Clinical lead virology consultant who will ensure that these are discussed at the relevant governance meetings to review the results and make recommendations for further action.

8. Summary of development and consultation process undertaken before registration and dissemination

The authors listed above drafted this document on behalf of the IP&C Department who has agreed the final content.

During its development it has been circulated for comment to:

Matrons and Senior Nurses	HICC
Ward Sisters and Charge Nurses	Consultant Virologists
Health and Safety Department	Operations Centre Manager
Workplace Health and Wellbeing	United Kingdom Clinical Virology Network Representatives
Communications Team	

All comments received were considered and incorporated if relevant.

This version has been endorsed by the HICC.

9. References

Public Health England. Updated guidelines on post exposure prophylaxis (PEP) for varicella/shingles. June 2019

CDC (2019) *Shingles (Herpes Zoster). Centers for Disease Control and Prevention*

Centres for Disease Control and Prevention, Epidemiology and Prevention of Vaccine-Preventable Diseases, 13th Edition April, 2015
https://cks.nice.org.uk/shingles

https://cks.nice.org.uk/chickenpox

Department of Health- Varicella: the green book, chapter 34, 2015 Varicella-green book Epidemiology, outcome and control of varicella-zoster infection,

Miller E, Marshall R, Vurdien J, Reviews in Medical Microbiology 1993; 4. 222-230. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases, 7th edition. 2009

10. Equality Impact Assessment (EIA)

This guideline has been screened to determine equality relevance for the following equality groups: race, gender, age, sexual orientation and religious groups. This guideline is considered to have little or no equality relevance.

Monitoring Compliance/Effectiveness Table						
Element to be monitored *(For NHSLA documents this must include all Level 1 minimum requirements)*	***Lead Responsible for monitoring*** *(Title needed & name of individual where appropriate)*	***Monitoring Tool / Method of monitoring***	***Frequency of monitoring***	***Lead Responsible for developing action plan & acting on recommendations***	***Reporting arrangements*** *(Committee or group where monitoring results and action plan progress are reported to)*	***Sharing and disseminating lessons learned & recommended changes in practice as a result of monitoring compliance with this document***
Compliance with isolation guidelines	DIPC/IP&CT	Audit	Every three years	DIPC/Clinical Lead Virology Consultant	Safety [clinical] sub-board	
Compliance with use of VZV post exposure prophylaxis	Consultant Virologist	Retrospective review	Every three years	Consultant Virologist/DIPC	Safety sub-group	