Comment Title: Care of children exposed to monkeypox

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Monkeypox is an orthopox DNA viral infection endemic to Central and West Africa, occasionally exported to other regions. Until recently, human-to-human transmission was uncommon. The current global outbreak since May 2022 was declared a Public Health Emergency of International Concern by WHO on 23 July 2022, with over 16,000 cases in over 70 non-endemic countries, nearly all with no epidemiological link to endemic countries. Nearly all cases identify as gay or bisexual or other men who have sex with men, acquired mainly through sexual contact. Cases have appeared beyond this high-risk network, including women and children, with 74 cases reported globally in those under 18 years, including 23 children aged 0–4. Currently, the risk of transmission to children appears low. Limited data indicate, however, that young are at higher risk of severe or fatal disease in endemic[1-2] and non-endemic[3] countries. There have been no reported deaths in children in the current outbreak, perhaps reflecting lower mortality with the West African clade. Child mortality in previous case series was often associated with co-infection and malnutrition.

In the absence of published guidance, the Royal College of Paediatrics & Child Health (RCPCH) formed a Monkeypox Working Group to guide management of children exposed to monkeypox,[4] drawing on the expertise of paediatric members of the National Health Service High Consequence Infectious Disease (Airborne) (HCID-A) network. As of 18 July, the network had overseen the management of over 2050 cases of adult monkeypox in England during the current outbreak in addition to supporting management of exposed children. Based on this experience and current understanding of risk, we present pragmatic guidance on managing children exposed to monkeypox (see Figure 1). Guidance has been published elsewhere covering management of antenatal and perinatal risks to newborns.[5]

Risk assessment

Childhood exposures typically occur at home, school or other close-contact settings. In adolescents, sexual contact should be considered. Like varicella and many other infections, risk from exposure is determined by (1) index case infectivity, (2) the nature and duration of the exposure and (3) vulnerability of the exposed child.[4] Transmission mostly depends on direct contact with lesions or fomites, with close physical contact being the primary risk. Sharing of bed linen and towels may also increase risk of transmission. Covered lesions pose less risk than exposed lesions. Obtaining accurate information may not always be possible. There is no evidence that young children are more vulnerable to becoming infected than others following identical exposures. However, children under five and the immunocompromised are likely to be at risk of more severe disease if infected, hence greater caution is appropriate. The UK Health Security Agency have produced a framework for risk

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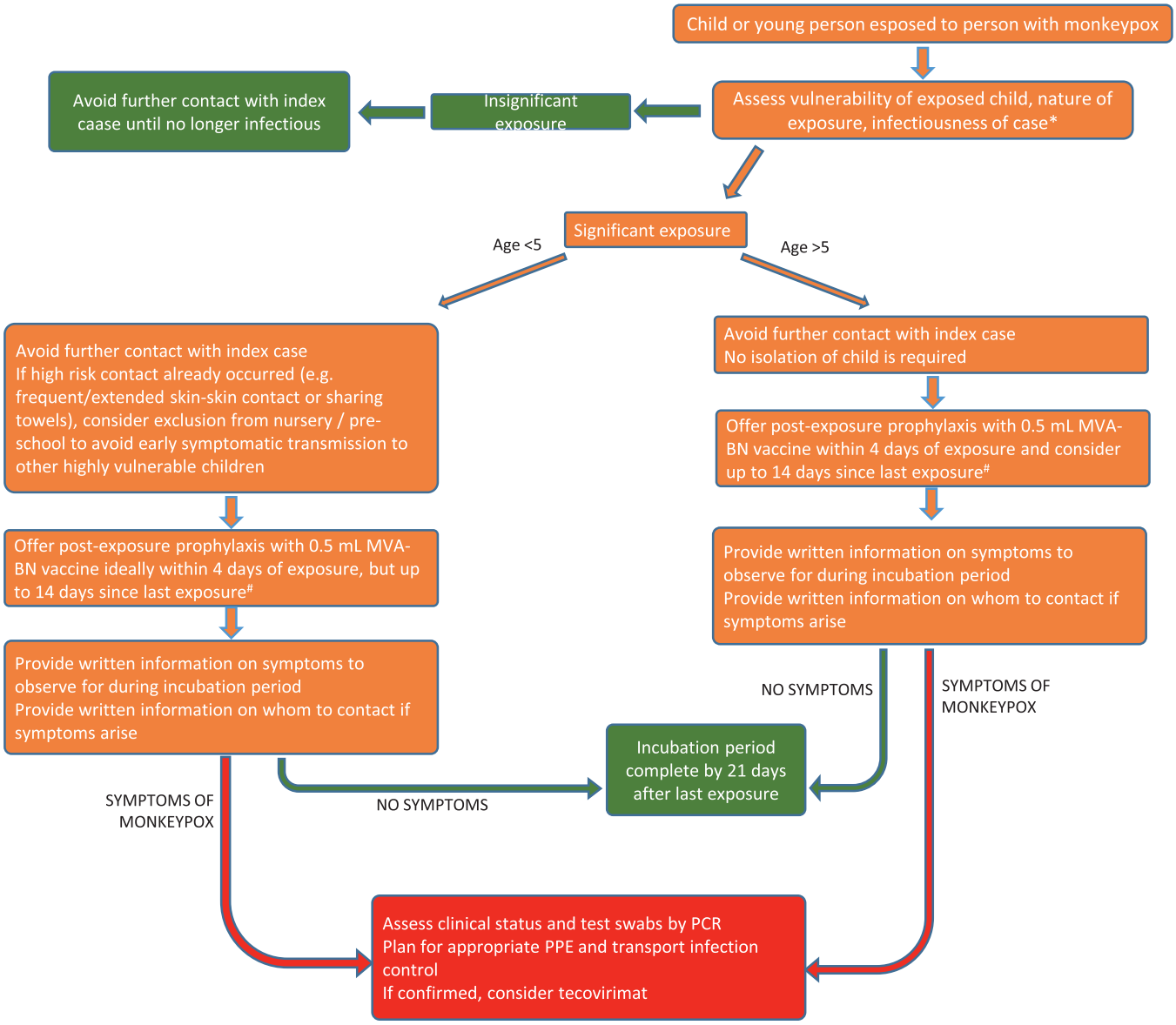

Figure 1. Care of child or young person exposed to monkeypox.

categorisation used to determine precautions regarding onward transmission and vaccine eligibility.[6]

Avoiding further contact with the index case

In those countries where public health authorities are obliged to contact those exposed, the index case should be informed about this, so they have opportunity to disclose their diagnosis themselves if they wish to do so. The identity of the index case should not be disclosed. They should minimise further contact with young children aged under five years, pregnant women and the immunocompromised. Where possible, separate facilities should be used for eating, bathing and toileting, or be carefully cleaned after use.[7]

Isolation and monitoring of exposed children

The large majority of children exposed in household, school or other close settings do not develop symptoms. They are unlikely to be infected. It is not known whether exposure can lead to asymptomatic infection and if this risk differs in children. Serological study of those exposed may clarify this. Even if asymptomatic infection occurs, they are unlikely to transmit infection if asymptomatic. In general, children need not isolate

following exposure and should continue to attend school. Individual risk assessment should be made about return to nursery/pre-school for those under five years. Healthcare appointments need not be deferred. Routine childhood immunisations should wait 21 days after last exposure to avoid symptomatic vaccine reactions (e.g. fever or rash) being mistaken as monkeypox symptoms.

Parents/carers of exposed children should be advised of monkeypox symptoms, including headache, fever, malaise, fatigue, rash, and lymphadenopathy, and told whom to contact should these develop.

Post-exposure vaccination of children

Modified vaccinia Ankara (MVA-BN; Invanex in Europe; JYNNEOS in United States) is a third-generation smallpox vaccine. It cannot replicate in human cells or cause disease. MVA-BN has been used for both pre- and post-exposure prophylaxis in previous monkeypox outbreaks,[8] and is safe and immunogenic in adults. There are no paediatric studies of MVA-BN immunogenicity or efficacy against smallpox or monkeypox. The vaccine is unlicensed in children. Other MVA-based vaccines with higher MVA doses than MVA-BN, have reassuring safety and reactogenicity profiles in children[9] MVA-BN was safely given to a few children as post-exposure prophylaxis during the 2018 and 2019 UK monkeypox outbreaks.[8]

MVA-BN should be given subcutaneously at a dose of 5×10^7 Inf.U. (0.5 mL) within 4 days of exposure to prevent disease, and if given up to 14 days after last exposure, may reduce disease severity. It should not be delayed even if the child has recently received another vaccination. A single dose is recommended, unless at ongoing exposure risk, when a second dose may be administered at least 28 days later. MVA-BN can be given to immunocompromised children and those living with HIV.[10] Children with atopic dermatitis should be closely monitored after vaccination. The same vaccine dose, schedule and recommendations apply to children of any age.

Symptomatic children

Attention should be given to infection control when planning clinical assessment and testing. Viral swabs of vesico-pustular lesions should be tested by PCR. In the absence of vesico-pustular lesions, swab the throat and any early skin lesions. There are currently no data to inform the management of confirmed monkeypox in children. Optimal care will require a multidisciplinary team including paediatric infectious diseases specialists alongside physicians experienced in treating monkeypox in adults. There is very limited data on the anti-orthopox agent tecovirimat which may be used in severe or high-risk cases. It is crucial that information is collected on its pharmacokinetics, efficacy and safety.

Conclusions

The current monkeypox outbreak is unprecedented and is a global public health emergency. There is an urgent need to develop evidence for safe pathways for the identification, assessment and management of exposed children. Exposed and affected children need enrolling into registries to understand the full spectrum clinical manifestations, disease progression and outcomes. Studies of antivirals and vaccines must include children to develop an evidence base for future care.

Contributors

JMC and SL conceived of the article; JMC, AB, SE, ME, DH, SK, JK, HL, SO, DP, AR, EW, BW and SL contributed to writing, review and editing.

Declaration of interests

None of the authors have any potential conflict of interest to declare.

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