Information for staff on Pneumocystis Pneumonia (PcP)

Outbreak Prevention and Management

The purpose of this information is to provide an aide-memoire for clinical staff and Infection Prevention and Control Teams (IPCT), who may be involved in the outbreak prevention and management of PcP.

All staff should be familiar with Standard Infection Control Precautions (SICPs) and transmission-based precautions (TBPs).

The following advice is supplementary and provides details of specific actions necessary to prevent and manage PCP outbreaks. It should be noted that there is currently no up-to-date National or European Guidance relating to the Prevention and Management of PcP in high risk patients.

Outbreak Prevention

What is PcP?

PcP is caused by the opportunistic fungus *Pneumocytis jirovecii* (formerly *P. carinii*). Typical presentation includes a sub-acute onset of cough, dyspnoea and fever[1], which develops after a relatively long incubation period, ranging from approximately 3-12 weeks.[2;3] Transmission is considered to occur via the airborne route, although there is still a lack of consensus regarding the exact mechanism.[4]

Which patient groups are considered high risk for infection?

Severely immunocompromised patients including those with HIV (CD4+ counts < 200 cells/µl), haematological and solid malignancies receiving cytotoxic chemotherapies, solid organ transplant patients, those on high dose steroids and patients treated with immunosuppressive regimens for inflammatory conditions.[5;6]

How is a potential PcP outbreak identified?

As a guide; a single healthcare-associated case in a high risk patient will require appropriate investigations and should be considered as part of 'alert organism' Infection Prevention and Control Teams (IPCT) actions.[4] An outbreak may be suspected if the incidence of infection is higher than normally expected, and where there is a potential link in time and place.

How can PcP be prevented?

Use of prophylaxis is considered to be the most successful prevention strategy for PcP. Prophylaxis with co-trimoxazole (as a first line agent) of appropriate at-risk patient groups is recommended. Dapsone or pentamidine are typically prescribed as alternatives.[1;4-6] The duration of prophylaxis varies depending on the patient's condition and level of immunosupression.[1;6]

Outbreak Management

How should PcP be managed?

Successful management of infection is attributed to appropriate treatment of affected patients. As with prophylaxis, patients should be treated with co-trimoxazole as the first-line agent (a number of alternatives are also available).[4;6] Treatment duration is approximately 2-3 weeks.[5;6] In addition, it may be necessary to consider prophylaxis for all immunosuppressed contacts,[4] including patients who have been discharged, up to 12 weeks prior to recognition of the outbreak (as determined by the incubation period). **Good Practice Point**

Do patients with PcP require isolation?

Unlike the majority of microorganisms transmitted via the airborne route, P. jirovecii is considered to only pose an infection risk to immunosuppressed patients, therefore all precautions relate to preventing ongoing transmission in this patient group:

- As far as is practicable, avoid placing patients diagnosed with PcP in the same ward/healthcare area as immunocompromised patients.[7] Consider isolating patients with PcP either in a single room in a ward/area not affected by the outbreak or a negative pressure room on the same ward, until resolution of symptoms or discharge from hospital.[4]
- In an outbreak, all immunocompromised patients should be encouraged to wear single use, fluid resistant masks during transport between wards/clinical areas, to reduce the likelihood of cross-transmission.[4]
- Since there is currently no evidence of PcP being transmitted from colonised healthcare workers to patients,[8-10] there is no rational for the wearing of masks by healthcare workers during PcP outbreaks.
- Since PcP is unlikely to affect immunocompetent hosts, consider excluding causes of underlying immunosuppression in those diagnosed with the infection.[6]

Supporting Outbreak Literature

The scientific and nursing literature was searched for reports of PcP outbreaks in health and social care settings. A total of 18 studies, spanning the last 10 years were evaluated. A summary of the results is presented below.

Background: Outbreaks caused by *P. jirovecii* are often recognised late. This is generally considered to be due to the long-incubation period associated with the infection, which is typically followed by a non-specific presentation and often initially mistaken for other infectious causes.

Population/setting: All outbreaks occurred in patients receiving immunosuppressive therapy. The majority of outbreaks occurred in renal transplant patients.[2;3;10-23] One outbreak was reported in both liver and renal transplant patients[24] with a further outbreak reported in rheumatoid arthritis patients.[9] One outbreak occurred in paediatric patients[16] with the remainder affecting adults. All studies described patients who were linked by defined in-patient or out-patient settings. None of the patients were receiving PcP prophylaxis immediately prior to the start of each outbreak. The majority of transplant patients were considered to be low risk for infection; with the post transplantation period being > 12 months (2-264 month range) in most cases.

Transmission: Transmission is considered to occur through the air-borne route. The majority of studies indicated *de novo* human-to-human transmission, rather than re-activation of latent infection, as was originally hypothesized in early studies. A number of outbreak studies stipulated that transmission was likely to have occurred directly between patients only, as screening of HCW associated with the outbreaks yielded negative results. Transmission was also thought to occur from both symptomatic and asymptomatic patients. Environmental sampling was undertaken in a limited number of studies only. No clear consensus could be drawn and only two studies concluded that an environmental source could also have contributed to the documented outbreak.

Outbreak control measures: Treatment of affected patients with appropriate agents (first line co-trimoxazole) was found to be effective and resulted in gradual termination of the outbreaks. Isolation of patients was not routinely initiated, with only one study implementing isolation precautions (patients managed in a single room until resolution of clinical symptoms). The majority of studies also reported that ‘blanket prophylaxis’ (first line co-trimoxazole) of all patients in the affected setting was also considered to be an important factor contributing to outbreak termination.

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