

Infections in Psychiatric Facilities, With an Emphasis on Outbreaks

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Abstract and Introduction

Abstract

Outbreaks of infectious diseases in psychiatric units are very different from those in intensive care units or acute medical-surgical units. Outbreaks in psychiatric units are most often caused by agents circulating in the community. Infection control in psychiatric units also faces unique challenges due to the characteristics of the patients and facilities.

Introduction

Patients residing in psychiatric facilities have unique characteristics that differentiate them from patients in acute medical facilities. They usually have fewer comorbidities and indwelling devices in place than patients admitted to intensive care units or medical floors. They are typically ambulatory, and they mingle freely on many wards. There are some similarities between the long-term care residential environment and the psychiatry care environment: both groups of residents tend to stay for long periods of time, and they attend congregate events, such as group or recreational therapy. The 2008 Society for Healthcare Epidemiology of America/Association for Professionals in Infection Control and Epidemiology guidelines on infection prevention and control in long-term care facilities^[1] have some relevance to psychiatric facilities. The unique characteristics of psychiatric patients may make implementation difficult. For example, psychiatric patients may not cooperate with hygienic measures or health preventive measures, such as immunization. Alcohol hand rub use is often limited because of concerns about ingestion of alcohol by patients with a history of substance abuse. Psychiatric patients have a high incidence of chronic infection related to substance abuse and socioeconomic factors, including human immunodeficiency virus (HIV) infection, hepatitis B and C, and tuberculosis.^[2-4] In this review, we will describe the unique problems facing infection prevention in psychiatric facilities, with an emphasis on outbreaks.

Respiratory Tract Infection

Respiratory tract infections account for most outbreaks in psychiatric units. summarizes the epidemiologic features of reported respiratory tract infection outbreaks in psychiatry units.

Table 1. Epidemiologic Features of Respiratory Tract Infection Outbreaks

Year of outbreak	Duration of outbreak	Facility location, description, no. of beds	No. of cases of infection		Attack rate, ^a %		Case fatality rate, ^b %		Additional outbreak control measures	Source
			R	S	R	S	R	S		

Respiratory syncytial virus										
2005	1 week	Taiwan, psychiatric ward in tertiary hospital	8	4	NA	NA	NA	NA	Single cubicle isolation of infectious patients and cohort nursing care	Huang et al ⁵
Adenovirus type 35										
1995	6 weeks	Rhode Island, chronic psychiatric care facility	14	4	26.4	2.0	7.1	0	NA	Sanchez et al, ⁶ Klinger et al ⁷
Human metapneumovirus										
2005	8 days	Taiwan, 50-bed psychiatric ward	12	1	30.8	7.7	8.3	0	NA	Tu et al ⁸
2005	3 weeks	Hong Kong, 610-bed chronic psychiatric care facility	31	0	56.3	0	0	0	Temporary ward closure, directly observed hand rub	Cheng et al ⁹
Influenza virus										
1992, first outbreak	1 month	Japan, 230-bed residential facility for mentally handicapped people	85	75	37.0	31.4	3.5	0	Postexposure prophylaxis was given inconsistently	Sugaya et al ¹³
1993, second outbreak	6 weeks	Same as above	134	58	59.0	24.3	0.7	0	NA	Sugaya et al ¹³
1995	1 month	Massachusetts, 100-bed dementia special care unit in VA	45	NA	42.8	NA	46.7	NA	NA	Brandeis et al ¹²
1989	2 weeks	Czech Republic, psychogeriatric department in mental hospital	26	5	43.1 in total	50	NA	NA	Strihavková et al ¹⁰	
2006	1 week	Pennsylvania, 26-bed closed adult unit in VA	8	8	30.7	20.0	0	0	Postexposure prophylaxis	Risa et al ¹¹
Group A streptococci										
1973	7 weeks	England, 3 wards in 1,400-bed psychiatric hospital	10	0	0.3	0	0	0	NA	Dowsett et al ¹⁶
1984	6 months	United States, 23-bed chronic geropsychiatric hospital	36	0	30	0	0	0	Mass antibiotic treatment of residents, admissions and discharges stopped for 10 days	Pritchard and Kerry ¹⁷

1991, first outbreak	6 weeks	New York, 46-bed closed mental health unit	24	3	52.2	NA	0	0	Bathing residents with a germicidal soap, disinfection of all contact surfaces	McNutt et al ¹⁸
1991, second outbreak	6 weeks	Same as above	6	1	13.0	NA	0	0	NA	McNutt et al ¹⁸
2003	4 months	Illinois, 251-bed residential facility for mentally handicapped people	57	10	22.7	2.0	0	0	NA	Dworkin et al ¹⁵

Note NA, not available; R, residents; S, staff; VA, Veterans Affairs hospital.
a No. of infected cases × 100/no. of total residents or staff in the institution.
b No. of deaths × 100/no. of infected cases.

Respiratory Syncytial Virus (RSV)

An outbreak of nosocomial RSV infection occurred in a psychiatric ward of an acute tertiary care hospital in central Taiwan in August 2005.^[5] A total of 8 patients and 4 healthcare workers developed fever with upper respiratory symptoms. The mean age of these patients was 42.1 years (range, 21–82 years). Three patients had dementia, and 5 patients had schizophrenia. All patients recovered. The duration of the transmission course was limited to 1 week.

Adenovirus

Adenovirus type 35 is an uncommon group B adenovirus, and it is isolated mostly from immunocompromised patients. An outbreak of adenovirus type 35 infection occurred in a chronic psychiatric care facility in Rhode Island in 1995.^[6,7] Fourteen (26%) of 53 residents and 4 (2%) of 200 staff developed radiographic evidence of pneumonia; 86% of pneumonia patients and 82% of the other residents smoked. The 6 patients were admitted to the intensive care unit. Of the 6 patients, 3 had chronic medical problems, including renal failure, chronic obstructive pulmonary disease, and diabetes. One patient with end stage renal disease receiving hemodialysis died.

Human Metapneumovirus (hMPV)

hMPV is a paramyxovirus that causes acute respiratory infection mostly in children and severe pneumonia in immunocompromised and elderly patients. Outbreaks of hMPV infection in psychiatric wards of acute care hospitals have been reported from Taiwan^[8] and Hong Kong.^[9] In the outbreak in Taiwan, 12 (30.6%) of 39 patients and 1 (7.7%) of 13 staff involved in the ward developed symptoms. None of the patients had left the unit in the previous month before the outbreak. The staff commuted to work daily. None of the visitors who had contact with the patients were ill. One patient, who had schizophrenia, uncontrolled diabetes mellitus, and a history of heavy smoking, died of respiratory failure. A large psychiatry department in Hong Kong experienced 6 nosocomial outbreaks in the year 2005, of which 4 were likely related to a respiratory viral infection, including hMPV, influenza A virus, and rhinovirus.^[9]

Management recommendations (RSV, adenovirus, hMPV). Psychiatric units may be physically incompatible with basic contact precautions because of communal living arrangements, such as shared bathrooms and dining areas. Alcohol hand rub use is often limited because of concerns about inappropriate use of alcohol. Isolation of a patient with an acute psychiatric illness may have adverse effects on his or her psychiatric condition. Modified infection control strategies are required to solve outbreaks in psychiatry units promptly.

In the RSV outbreak, single cubicle isolation of infectious patients with cohort nursing care was the most important factor.^[5] In the hMPV outbreak, dispensing alcohol hand rub to both hands of patients by ward staff every 4 hours during the daytime and supervising them to rub their hands for at least 15 seconds may have contributed to outbreak control.^[9] Only 1 nosocomial parainfluenza virus type 3 outbreak occurred in the following year.

Influenza Virus

Influenza outbreaks in psychiatry facilities and psychiatry units in acute care hospitals have been reported in several studies.^[10–13] Twenty-one (46.7%) of 45 symptomatic patients in a dementia special care unit^[12] and 13 (50%) of 26 in a geriatric psychiatry department^[10] died. Risk factors for death in the dementia special care unit included coexisting conditions, low Mini–Mental State Examination score, and low Bedford Alzheimer Nursing Scale score. In the large sequential outbreaks caused by influenza A and B viruses involving 352 cases in Japan,^[13] more than half of the residents required full-time medical care for chronic underlying conditions. No residents or staff members received influenza vaccination before the outbreaks. Of the residents, 25.2% had 2 episodes of influenza-like illness. An influenza A outbreak occurred in a 26-bed locked adult behavioral health unit in a Veterans Affairs hospital in 2006.^[11] Eight (31%) of the 26 patients and 8 (20%) of the 40 staff reported influenza-like illness; 46% of the patients present on the ward and 55% of the direct care staff on the unit received immunization prior to the outbreak. Only 25% of the immunized patients had influenza-like illness, whereas 36% of the nonimmunized patients became ill. Asymptomatic patients were given oseltamivir, after which no additional cases occurred.

Management Recommendations. In influenza outbreaks, the combination of infection control procedures and chemoprophylaxis are effective. Symptomatic staff members should be encouraged to be off duty. Immunization is particularly important in preventing influenza outbreaks since psychiatric patients may not be able to comply with hand hygiene measures and restrictions on group activities because of their psychiatric illness. Immunization of staff should be given high priority, as staff members may be the source of outbreaks among patients. Administration of oseltamivir to unaffected patients should be considered if transmission is ongoing. The incidence of adverse neuropsychiatric events associated with administration of oseltamivir appears to be low.^[14]

Group A Streptococci (GAS)

Outbreaks of noninvasive GAS disease in mental health units have been reported in 4 studies.^[15–18] The clinical manifestations included pharyngitis, impetigo, conjunctivitis, and bacteremia. No deaths were reported. The duration of outbreaks varied from 6 weeks to 6 months. The outbreaks in mental health unit housing primarily affected ambulatory residents with fewer medical comorbidities and were associated with noninvasive disease, while invasive GAS disease, including necrotizing fasciitis and pneumonia, were often reported in long-term care facilities for physically impaired patients with multiple comorbidities.^[19]

Management Recommendations. A low threshold for culturing skin and throat lesions should be maintained once outbreaks are suspected. GAS colonization screening among all facility residents and staff may be considered in outbreak investigations when the attack rates are high, with administration of antibiotic therapy for persons with carriage or disease. Mass therapy may be indicated when new GAS infections appear despite attempts to improve infection control and targeted treatment of those with carriage or infection. An outbreak of GAS infection should prompt a thorough review of infection control practices. Improper practices identified as contributing to an outbreak included reuse of washcloths among multiple patients and failure to use gloves during wound care.^[19]

Tuberculosis

Tuberculosis was once highly prevalent in US psychiatric facilities. Outbreaks of tuberculosis are now rarely reported from US facilities. However, a recent report from Florida documents transmission of tuberculosis to 17 persons by a patient with chronic schizophrenia. Transmission occurred within an assisted living facility in which he resided and a psychiatric hospital to which he was admitted.^[20] Experience in other developed countries demonstrates the potential for disease transmission in this setting. Outbreaks of pulmonary tuberculosis have

occurred in France^[21] and Japan.^[22] In a long-term care facility in France, 6 (40%) of 15 mentally handicapped HIV-seronegative patients developed culture-positive pulmonary tuberculosis.^[21] The 6 patients were transferred to the pulmonary department because appropriate isolation in the facility was not possible. In a long-term care unit of a psychiatry facility in Japan,^[22] 10 patients developed pulmonary tuberculosis over 2 years. One inpatient, who had been hospitalized in the unit and had had respiratory symptoms for 2 years, died of pulmonary tuberculosis in another facility 5 months prior to the outbreak. However, it was not reported to the unit promptly, which delayed resolving the outbreak.

Management Recommendations. A significant proportion of patients admitted to a psychiatric facility are likely to belong to populations at risk for tuberculosis, including those with a history of substance abuse, homelessness, or previous institutionalization or incarceration. Facilities should consider instituting a tuberculosis screening program for patients on the basis of the characteristics of the population served and the local prevalence of tuberculosis. Consultation with local public health authorities is recommended. Patients with symptoms suggestive of tuberculosis, such as persistent cough, persistent fever, or unexplained weight loss, should undergo medical evaluation.

Gastrointestinal Infection

Gastrointestinal infection is the second most common outbreak in psychiatry units.

Norovirus

Noroviruses are single-stranded, nonenveloped RNA viruses frequently associated with gastroenteritis outbreaks peaking during the winter.^[23] Noroviruses are spread primarily by the fecal-oral route. A low infectious dose (below 10² viral particles), prolonged asymptomatic shedding, environmental stability, and lack of lasting immunity facilitate outbreaks. Outbreaks occur in all age groups and in many settings, including restaurants, cruises, long-term care facilities, and hospitals. Although gastroenteritis due to norovirus is usually self-limiting, patients with underlying diseases, including cardiovascular disease and renal transplant, are more likely to develop complications, and diarrhea in elderly patients tends to persist longer.

Several studies have reported norovirus outbreaks in psychiatry units ().^[24–27] In an outbreak in a locked pediatric psychiatric unit,^[26] the patients and the staff were sharing meals as a part of therapy. The index patient was a 9-year-old boy with autism and mood disorders who could not manage his own toileting and had a behavior problem of frequent fecal smearing on environmental surfaces. He already had nausea, vomiting, and loose stools on the day of admission. The index patient in an outbreak in Canada^[25] was a 58-year-old man with mania. He was admitted 3 weeks prior to the onset of the outbreak; however, he was allowed to leave the hospital periodically. The number of infected cases varied. Their symptoms were usually mild and recovered without complications.

Table 2. Epidemiologic Features of Norovirus Outbreaks

Year of outbreak	Duration of outbreak	Facility location, description, no. of beds	No. of cases of infection		Attack rate, ^a %		Case fatality rate, ^b %		Additional outbreak control measures	Source
			R	S	R	S	R	S		
2004	8 days	North Carolina, locked pediatric psychiatric unit in acute care hospital	3	10	75	28	0	0	Closed to all admissions, precluded staff from eating in the unit	Weber et al ²⁶

2004	10 weeks	Maryland, 946-bed tertiary care hospital clustered in CCU and psychiatry units	39	76	16.7	200	NA	NA	Cessation of group therapy, limited treatment outside the units	Johnston et al ²⁴
2006	11 days	Canada, 42-bed acute care psychiatry area in acute care hospital	16	9	38.1	NA	0	0	Discouraged eating communal food, prepared individually wrapped food	Gilbride et al ²⁵
2005, first outbreak	18 days	Taiwan, 445-bed psychiatric care center	70	7	21.9	8.2	NA	NA	Cessation of occupational therapies in the wards	Tseng et al ²⁷
2006, second outbreak	30 days	Same as above	31	0	8.9	0	NA	0	Same as above	Tseng et al ²⁷
2006, third outbreak	27 days	Same as above	58	0	17.5	0	NA	0	Same as above	Tseng et al ²⁷
2007, fourth outbreak	14 days	Same as above	13	0	3.7	0	NA	0	Same as above	Tseng et al ²⁷

Note CCU, cardiac care unit; NA, not available; R, residents; S, staff.

a No. of infected cases × 100/no. of total residents or staff in the institution.

b No. of deaths × 100/no. of infected cases.

Management Recommendations. Any disease transmitted by the fecal-oral route in this patient population may evolve rapidly into an outbreak because of the inability to restrict patients to their rooms and to maintain isolation precautions. Contamination of food and drink should be avoided by means of proper hygiene measures. The preparation and distribution of communal food for patients should be done by healthcare workers, or the eating of communal food may need to be discouraged during the outbreak. Symptomatic patients should be cohorted together when single rooms are not available. Hand hygiene with soap and water is recommended rather than a waterless alcohol-containing gel, as norovirus is not inactivated by alcohol. Enhanced environmental disinfection may help decrease transmission. Norovirus is not inactivated by commonly used disinfectants such as quaternary ammonium compounds; environmental decontamination procedures should use sodium hypochlorite.^[28] Staff members are advised to wear a surgical mask in addition to gowns and gloves when cleaning the contaminated area to prevent transmission from aerosolization of the viral particles. Suspension of group therapy sessions and temporary closure to new admissions may be necessary. Affected staff members should stay home until asymptomatic for 48 hours.

Salmonella Species

Outbreaks of *Salmonella* enteritis in psychiatry units have been reported from several countries ().^[29–33]

Outbreaks occurred through close person-to-person contact^[29,32,33] or because of contamination of food.^[29,30]

Table 3. Epidemiologic Features of *Salmonella* Enteritis Outbreaks

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Year of outbreak	Organism	Duration of outbreak	Facility location, description, no. of beds	Transmission	No. of cases of infection		Attack rate, ^a %		Case fatality rate, ^b %		Source
					R	S	R	S	R	S	
1990	<i>S. typhi</i>	5 months	Singapore, 1,965-bed psychiatric institution	Person to person	95	0	4.8	0	0	0	Goh et al ²⁹
1996	<i>S. enteritidis</i>	NA	Ireland, psychiatric hospital	Chocolate mousse cake	36	29	20	12	NA	NA	Grein et al ³⁰
1990	<i>S. enteritidis</i>	1 week	UK, 300-bed hospital for mentally handicapped patients	Beef rissole	101	8	37	NA	1	0	Evans et al ³¹
1984	<i>S. typhimurium</i>	3 weeks	UK, 1,036-bed psychiatric hospital	Person to person	11	12	NA	NA	0	0	Galloway et al ³²
1989	<i>S. typhimurium</i>	11 weeks	UK, 890-bed psychiatric hospital	Person to person	55	4	NA	NA	0	0	Ahmad et al ³³

Note NA, not available; R, residents; S, staff.

a No. of infected cases × 100/no. of total residents or staff in the institution.

b No. of deaths × 100/no. of infected cases.

Management Recommendations. The identification of the asymptomatic reservoir of *Salmonella* by rectal swabbing is a major approach in controlling outbreaks. Treatment of identified asymptomatic patients is controversial. Mass treatment with ciprofloxacin was provided in outbreaks in the United Kingdom to reduce the carriage period and to eradicate the reservoir of infection.^[31]

Hepatitis A

Hepatitis A outbreaks have been observed in institutions for mentally handicapped patients,^[32,34,35] involving from 8 to 60 patients. In one outbreak,^[36] 19 patients developed jaundice, while 32 patients remained asymptomatic. In the event of an outbreak, unimmunized residents and staff should receive immunoglobulin. Unimmunized children should receive hepatitis A vaccine.^[37]

Other Viruses

An outbreak of acute gastroenteritis due to group A rotavirus and sapovirus, which are major pathogens of acute gastroenteritis among infants and young children, involving 57 cases occurred in a mental health care facility in Japan in 2002.^[38] It involved 10 of the 11 separate dormitories in the facility and resolved in 7 weeks.

Other Bacteria

An outbreak of diarrhea associated with *Shigella sonnei*^[39] on a psychogeriatric ward was reported from the United Kingdom in 1986. An outbreak of cholera caused by *Vibrio cholerae* O1 occurred in a psychiatric hospital in Singapore in 1990, which resulted in the death of 2 patients.^[40] Epidemiological investigations suggested that

transmissions occurred through close person-to-person contact rather than food or water contamination. In addition to the general infection control measures, surveillance of diarrhea, rectal swabbing of all asymptomatic inmates, isolation of those found to be infected, and mass chemoprophylaxis with doxycycline rapidly brought the outbreak under control.

Parasites

The prevalence of intestinal parasitic infections among the residents of psychiatric institutions has been reported as 8.4%–75.2% from several countries other than the United States.^[41–44] Patients with lower levels of education, unmarried patients, patients sent by social workers to hospitals, and patients with nonschizophrenic diseases were more likely to have intestinal parasites.^[42] Of residents with mental retardation, 53% had evidence of infection with *Entamoeba histolytica* when 2 cases of amoebic colitis were detected in the institution in Japan.^[44] An outbreak of *Trichuris trichiura* in a ward for severely mentally handicapped patients was reported from the United Kingdom.^[45] Seventeen patients were dirt eaters, and 8 habitually smeared faces. There was heavy contamination of soil samples with *T. trichiura* ova in the lawn to the rear of the ward.

Skin Infection

Skin infection is the third most common outbreak in psychiatry units.

Scabies

Scabies outbreaks have been reported in both acute care facilities and long-term care facilities.^[46,47] In Japan in 2002, 26 patients in a closed psychiatric ward of a psychiatry facility developed scabies. Four of them developed recurrence. No staff were affected.

Management Recommendations. Prompt recognition of scabies followed by implementation of preventive measures is the mainstay to resolve outbreaks. Clothing and linens should be machine washed in hot water and dried thoroughly. Carpets and furniture should be vacuumed. Items that cannot be washed should be treated with an appropriate insecticide. Either local treatment (eg, 5% permethrin cream) or oral treatment (ivermectin at 200 µg/kg) can be used; however, oral treatment has the advantage of ease of administration. Topical treatment may be difficult to apply to uncooperative patients. Patients should be treated simultaneously.

GAS

Please refer to "Group A Streptococci (GAS)" in "Respiratory Tract Infection."

Methicillin-Resistant *Staphylococcus aureus* (MRSA)

Outbreaks of community-acquired MRSA skin and soft-tissue infections have been reported from various settings, including football teams and children on a camping trip.^[48] An outbreak of MRSA infections occurred in institutionalized adults with developmental disabilities in a psychiatry facility in Israel.^[49] Twenty of 28 residents developed 73 infectious episodes, including skin and soft-tissue infections, conjunctivitis, and external otitis, but no invasive disease. All isolates were genetically related by pulsed-field gel electrophoresis.

Management Recommendations. Personal hygiene and appropriate wound care needs to be emphasized. Draining wounds need to be covered with dressings.^[50] Reusing or sharing personal items (eg, linens and disposable razors) should be avoided. Cleaning efforts on high-touch surfaces should be focused. Decolonization with mupirocin with or without chlorhexidine or dilute bleach baths may be considered when patients develop recurrent MRSA infections.

Sexually Transmitted Diseases (STDs)

Sexual behavior on inpatient units ranged from 1.5% to 5% of adult patients.^[51] Patients in acute inpatient units who engaged in sex were more likely to be younger, to be single, and to have an eating disorder, bipolar disorder, or a personality disorder. Patients with a number of psychiatric illnesses are likely to engage in high-risk sexual behaviors.^[51,52] The prevalence of HIV among patients with chronic mental illness was reported to be between 3% and 10%, which is much higher than that among the general US population.^[2,3] The prevalence of seropositivity to hepatitis B and hepatitis C was 23.4%–32% and 9%–38%, respectively.^[2–4] A previous study showed that the prevalence of any type of STD among women with borderline personality disorder and substance use disorder was 64%.^[53]

Syphilis

An outbreak of early syphilis occurred in a psychiatry institution providing care to 983 patients in Serbia involving 87 cases.^[54] Some residents were allowed to leave the institution occasionally because the institution was of the semiopen type. Laboratory tests were performed for 145 patients who were considered to have suspected cases. Of the 145 patients, 31 were negative, 27 were treated because of their previous syphilis history, and 87 had early syphilis; 82 were heterosexual. Men and women had separate bedrooms, but all other areas were used jointly. Testing for HIV and other STDs was not performed. In addition to treating all suspected cases, the patients were not allowed to leave the institution during outbreak to prevent the spread of syphilis.

Management Recommendations. Patients admitted to psychiatric facilities should be offered testing for HIV, hepatitis B, and hepatitis C. Testing for other STDs should be performed on the basis of the findings of the history and physical examination performed on admission. Patients should be referred for appropriate treatment as soon as their psychiatric symptoms have stabilized to the point at which they can cooperate with treatment.

Conclusion

Psychiatric facilities should develop plans to monitor for the occurrence of outbreaks and to intervene effectively once an outbreak is identified. Facilities that are affiliated with acute care hospitals or health systems may have access to infection prevention professionals within the organization who can provide expertise. Facilities without access to expertise within their own organization should enlist the assistance of the local health department and/or infection control professionals from other facilities in the area. A key aspect of a control plan is the identification, in advance, of the person who will be responsible for coordinating the response to the outbreak.

As the majority of outbreaks in psychiatric facilities involve the respiratory tract, the gastrointestinal tract, or the skin, clinical monitoring for infections is straightforward and can be performed by querying and observing patients during routine care. Once a potential outbreak is identified, the facility staff should determine, in consultation with a hospital epidemiologist or the local health department, a plan for further diagnostic testing, if indicated, and a plan of outbreak control. Control measures will need to be tailored to the unique aspects of the patient population and the resources available to the facility.

References

1. Smith PW, Bennett G, Bradley S, et al. SHEA/APIC guideline: infection prevention and control in the long-term care facility. *Am J Infect Control* 2008;36:504–535.
2. Goff DC, Cather C, Evins AE, et al. Medical morbidity and mortality in schizophrenia: guidelines for psychiatrists. *J Clin Psychiatry* 2005;66:183–194.
3. Rothbard AB, Blank MB, Staab JP, et al. Previously undetected metabolic syndromes and infectious diseases among psychiatric inpatients. *Psychiatr Serv* 2009;60:534–537.
4. Tabibian JH, Wirshing DA, Pierre JM, et al. Hepatitis B and C among veterans on a psychiatric ward. *Dig*

5. Huang FL, Chen PY, Shi ZY, Chan CH, Huang SK. An unusual respiratory syncytial virus nosocomial outbreak in an adult psychiatry ward. *Jpn J Infect Dis* 2009;62:61–62.
6. Sanchez MP, Erdman DD, Torok TJ, Freeman CJ, Matyas BT. Outbreak of adenovirus 35 pneumonia among adult residents and staff of a chronic care psychiatric facility. *J Infect Dis* 1997;176:760–763.
7. Klinger JR, Sanchez MP, Curtin LA, Durkin M, Matyas B. Multiple cases of life-threatening adenovirus pneumonia in a mental health care center. *Am J Respir Crit Care Med* 1998;157:645–649.
8. Tu CC, Chen LK, Lee YS, et al. An outbreak of human metapneumovirus infection in hospitalized psychiatric adult patients in Taiwan. *Scand J Infect Dis* 2009;41:363–367.
9. Cheng VC, Wu AK, Cheung CH, et al. Outbreak of human metapneumovirus infection in psychiatric inpatients: implications for directly observed use of alcohol hand rub in prevention of nosocomial outbreaks. *J Hosp Infect* 2007;67:336–343.
10. Strihavková M, Havlíčková M, Tůmová B. An epidemic of type B influenza in the geriatric psychiatry department of a psychiatric hospital. *Cas Lek Cesk* 1990;129:1129–1132.
11. Risa KJ, McAndrew JM, Muder RR. Influenza outbreak management on a locked behavioral health unit. *Am J Infect Control* 2009;37:76–78.
12. Brandeis GH, Berlowitz DR, Coughlin N. Mortality associated with an influenza outbreak on a dementia care unit. *Alzheimer Dis Assoc Disord* 1998;12:140–145.
13. Sugaya N, Kusumoto N, Suzuki Y. Large sequential outbreaks caused by influenza A (H3N2) and B viruses in an institution for the mentally handicapped. *J Med Virol* 1996;50:120–125.
14. Toovey S, Rayner C, Prinssen E, et al. Assessment of neuropsychiatric adverse events in influenza patients treated with oseltamivir: a comprehensive review. *Drug Saf* 2008;31:1097–1114.
15. Dworkin MS, Park L, Barringer J, Curtis R. An outbreak of noninvasive group A streptococcal disease in a facility for the developmentally disabled. *Am J Infect Control* 2006;34:296–300.
16. Dowsett EG, Herson RN, Maxted WR, Widdowson JP. Outbreak of idiopathic erysipelas in a psychiatric hospital. *Br Med J* 1975;1:500–502.
17. Pritchard VG, Kerry CS. Streptococcal outbreak. *J Gerontol Nurs* 1988;14:19–23.
18. McNutt LA, Casiano-Colon AE, Coles FB, et al. Two outbreaks of primarily noninvasive group A streptococcal disease in the same nursing home, New York, 1991. *Infect Control Hosp Epidemiol* 1992;13:748–751.
19. Jordan HT, Richards CL Jr, Burton DC, Thigpen MC, Van Beneden CA. Group A streptococcal disease in long-term care facilities: descriptive epidemiology and potential control measures. *Clin Infect Dis* 2007;45:742–752.
20. Cavanaugh JS, Powell K, Renwick OJ, et al. An outbreak of tuberculosis among adults with mental illness. *Am J Psychiatry* 2012;169:569–575.
21. Lemaître N, Sougakoff W, Coëtmeur D, Vaucel J, Jarlier V, Grosset J. Nosocomial transmission of tuberculosis among mentally-handicapped patients in a long-term care facility. *Tuber Lung Dis*

1996;77:531–536.

22. Ota M, Isshiki M. An outbreak of tuberculosis in a long-term care unit of a mental hospital. *Kekkaku* 2004;79:579–586.
23. Harris JP, Lopman BA, O'Brien SJ. Infection control measures for norovirus: a systematic review of outbreaks in semi-enclosed settings. *Hosp Infect* 2010;74:1–9.
24. Johnston CP, Qiu H, Ticehurst JR, et al. Outbreak management and implications of a nosocomial norovirus outbreak. *Clin Infect Dis* 2007;45:534–540.
25. Gilbride SJ, Lee BE, Taylor GD, Forgie SE. Successful containment of a norovirus outbreak in an acute adult psychiatric area. *Infect Control Hosp Epidemiol* 2009;30:289–291.
26. Weber DJ, Sickbert-Bennett EE, Vinjé J, et al. Lessons learned from a norovirus outbreak in a locked pediatric inpatient psychiatric unit. *Infect Control Hosp Epidemiol* 2005;26:841–843.
27. Tseng CY, Chen CH, Su SC, et al. Characteristics of norovirus gastroenteritis outbreaks in a psychiatric centre. *Epidemiol Infect* 2011;139:275–285.
28. Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention. Updated norovirus outbreak management and disease prevention guidelines. *MMWR Recomm Rep* 2011;4(RR-3):1–18.
29. Goh KT, Teo SH, Tay L, Monteiro EH. Epidemiology and control of an outbreak of typhoid in a psychiatric institution. *Epidemiol Infect* 1992;108:221–229.
30. Grein T, O'Flanagan D, McCarthy T, Prendergast T. An outbreak of *Salmonella enteritidis* food poisoning in a psychiatric hospital in Dublin, Ireland. *Euro Surveill* 1997;2:84–86.
31. Evans MR, Hutchings PG, Ribeiro CD, Westmoreland D. A hospital outbreak of salmonella food poisoning due to inadequate deep-fat frying. *Epidemiol Infect* 1996;116:155–160.
32. Galloway A, Roberts C, Hunt EJ. An outbreak of *Salmonella typhimurium* gastroenteritis in a psychiatric hospital. *J Hosp Infect* 1987;10:248–254.
33. Ahmad F, Bray G, Prescott RW, Aquilla S, Lightfoot NF. Use of ciprofloxacin to control a *Salmonella* outbreak in a long-stay psychiatric hospital. *J Hosp Infect* 1991;17:171–178.
34. Kitahashi T, Tanaka T, Ishikawa Y, Hasegawa S. An outbreak caused by hepatitis A virus in an institution for the mentally handicapped—detection of hepatitis A virus RNA using CTAB method. *Kansenshogaku Zasshi* 1998;72:794–800.
35. Hofmann H, David H, Frisch-Niggemeyer W, Kunz C. Gamma globulin as a prophylactic measure in an outbreak of hepatitis A in an institution for mentally retarded children. *Wien Klin Wochenschr* 1981;93:584–587.
36. Helmsing PJ, Duermeyer W, van Hattem GC, Wielaard F. An outbreak of hepatitis A in an institution for the mentally retarded. *J Med Viro* 1980;5:143–150.
37. Fiore AE, Wasley A, Bell BP; Advisory Committee on Immunization Practices. Prevention of hepatitis A through active or passive immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep* 2006;55(RR-7):1–23.

38. Yan H, Abe T, Phan TG, et al. Outbreak of acute gastroenteritis associated with group A rotavirus and genogroup I sapovirus among adults in a mental health care facility in Japan. *J Med Virol* 2005;75:475–481.
39. Hunter PR, Hutchings PG. Outbreak of *Shigella sonnei* dysentery on a long stay psychogeriatric ward. *J Hosp Infect* 1987;10:73–76.
40. Goh KT, Teo SH, Lam S, Ling MK. Person-to-person transmission of cholera in a psychiatric hospital. *J Infect* 1990;20:193–200.
41. Giacometti A, Cirioni O, Balducci M, et al. Epidemiologic features of intestinal parasitic infections in Italian mental institutions. *Eur J Epidemiol* 1997;13:825–830.
42. Cheng HS, Wang LC. Intestinal parasites may not cause nosocomial infections in psychiatric hospitals. *Parasitol Res* 2005;95:358–362.
43. Gatti S, Lopes R, Cevini C, et al. Intestinal parasitic infections in an institution for the mentally retarded. *Ann Trop Med Parasitol* 2000;94:453–460.
44. Nishise S, Fujishima T, Kobayashi S, et al. Mass infection with *Entamoeba histolytica* in a Japanese institution for individuals with mental retardation: epidemiology and control measures. *Ann Trop Med Parasitol* 2010;104:383–390.
45. Allen KD, Green HT. An outbreak of *Trichuris trichiura* in a mental handicap hospital. *J Hosp Infect* 1989;13:161–166.
46. Vorou R, Remoudaki HD, Maltezou HC. Nosocomial scabies. *J Hosp Infect* 2007;65:9–14.
47. Bouvresse S, Chosidow O. Scabies in healthcare settings. *Curr Opin Infect Dis* 2010;23:111–118.
48. David MZ, Daum RS. Community-associated methicillin-resistant *Staphylococcus aureus*: epidemiology and clinical consequences of an emerging epidemic. *Clin Microbiol Rev* 2010;23:616–687.
49. Borer A, Gilad J, Yagupsky P, et al. Community-acquired methicillin-resistant *Staphylococcus aureus* in institutionalized adults with developmental disabilities. *Emerg Infect Dis* 2002;8:966–970.
50. Cohen SH, Gerding DN, Johnson S, et al. Clinical practice guidelines for *Clostridium difficile* infection in adults: 2010 update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA). *Infect Control Hosp Epidemiol* 2010;31:431–455.
51. Ford E, Rosenberg M, Holsten M, Boudreaux T. Managing sexual behavior on adult acute care inpatient psychiatric units. *Psychiatr Serv* 2003;54:346–350.
52. Sansone RA, Sansone LA. Sexual behavior in borderline personality: a review. *Innov Clin Neurosci* 2011;8:14–18.
53. De Genna NM, Feske U, Angiolieri T, Gold MA. Race and sexually transmitted diseases in women with and without borderline personality disorder. *J Womens Health* 2011;20:333–340.
54. Vlajinac H, Sipetic S, Bjekic M, Savcic G, Marinkovic J. Outbreak of early syphilis in an institution for the care of adults with mental disorders. *Epidemiol Infect* 2006;134:585–588.

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