

Scabies: Strategies for Management and Control

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ABSTRACT

Scabies is a highly contagious parasitic infestation of the skin and a clinically significant cause of morbidity, especially among people who are debilitated, immunocompromised, institutionalized, or elderly. The Pennsylvania Patient Safety Authority identified hundreds of scabies reports in the Pennsylvania Patient Safety Reporting System database, including information gaps in scabies-control practices. Implementation of an outbreak control plan is necessary to accurately identify, treat, and isolate individual scabies cases and to prevent and control outbreaks and disruption of facility operations. The key element to avoiding scabies outbreaks and treatment failures is a working knowledge of current scabies clinical indicators, surveillance, transmission, diagnosis, treatment, and control measures. Successful control of a scabies outbreak requires a facility-specific outbreak control plan, including techniques for early case identification and treatment, robust infection and environmental controls, and protocols for communication and education. (*Pa Patient Saf Advis* 2016 Jun;13[2]:66-73.)

INTRODUCTION

Scabies is a highly contagious skin infestation caused by the parasite *Sarcoptes scabiei* mite.^{1,2} The risk of scabies is increased for individuals who are immunocompromised or elderly in settings where close body and skin contact is common, such as in healthcare facilities or institutions.^{3,4} Scabies manifests in two ways: classic (typical) and crusted (atypical).³ Classic scabies is characterized by a raised rash and intense itching. In classic scabies cases, the person may be infested with 15 mites or fewer.³ Crusted scabies is a hyper-infestation that is often unrecognized and difficult to eradicate; in this form of the disease, thick crusted areas of skin contain thousands of mites.⁴ Mite infestation and accompanying scratching of the skin can cause lesions resulting in secondary infection or even death from sepsis.^{5,6} Scabies outbreaks can result from delayed or incorrect diagnosis or improper treatment of scabies infestation.¹

SCABIES IN PENNSYLVANIA HEALTHCARE FACILITIES

Pennsylvania Patient Safety Authority analysts queried the Pennsylvania Patient Safety Reporting System (PA-PSRS) database for scabies events reported from nursing homes from April 2014 (when nursing homes began reporting scabies) through November 2015 and from Pennsylvania hospitals and ambulatory surgical facilities (ASFs) from June 2004 (when the acute-care facilities first began reporting events) through November 2015. Pennsylvania nursing homes are also required by PA Code § 211.1. to report cases of scabies to the appropriate Division of Nursing Care Facilities field office.⁷ The PA-PSRS scabies criteria mirrors the 2014 revised McGeer criteria for long-term care.⁸ For more information see “Surveillance Criteria to Identify Scabies Cases.” The database was searched for indication of outbreaks, which were defined as three or more cases within a four-week period.⁹

Pennsylvania nursing homes reported 484 cases of scabies and 37 outbreaks. One hundred ten scabies events were reported from hospital inpatient, emergency, and outpatient settings, as well as from ASFs, with one outbreak occurring in a psychiatric unit (Table 1). Event report narratives from hospital and ASF settings identified problems associated with inadequate communication to receiving units or facilities, including delays in diagnosis, treatment, and instituting precautions; cancelled surgeries; and unrecognized contacts resulting in exposures.

The following are de-identified examples of scabies event narratives reported to the Authority from hospitals and ASFs:*

The patient was transferred from another facility with an active scabies infection and was targeted for standard isolation room. The handoff from the emergency department was given with no verbal or written documentation of scabies infection. Contact precautions were delayed and four staff members were exposed.

A technician went into the patient’s room to draw blood, and the nurse told her to be careful because the patient had scabies. There was no contact-precautions sign posted to indicate this.

The physician performed scabies scraping on a patient with positive results but did not communicate this to the nursing staff, and the patient was not on contact precautions for four hours.

* The details of the PA-PSRS event narratives in this article have been modified to preserve confidentiality.



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SURVEILLANCE CRITERIA TO IDENTIFY SCABIES CASES

Both criteria 1 and 2 must be present.

Criteria 1. The following:

- A maculopapular and/or itching rash

Criteria 2. At least one of the following:

- Physician diagnosis
- Laboratory confirmation by means of scraping or biopsy
- Epidemiologic link to a case of scabies with laboratory confirmation

Note: Rule out rashes due to skin irritation, allergic reactions, eczema, psoriasis, and other noninfectious skin conditions. Consider an epidemiologic linkage to a case if there is evidence of a common source of exposure.

Source: Stone ND, Ashraf MS, Calder J, et al. Society for Healthcare Epidemiology Long-Term Care Special Interest Group. Surveillance definitions of infections in long-term care facilities: revisiting the McGeer criteria. *Infect Control Hosp Epidemiol* 2012 Oct;33(10):965-77. Also available: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538836/>

A patient was transported from emergency [department] to imaging with a large, red, scaly appearing rash. [Staff was] not wearing personal protective equipment. The technician was not informed of the rash or possible contagious scabies infestation until returning the patient to emergency [department]. There was no isolation band on the patient and not marked in computer or chart.

Surgery was cancelled after admission and sedation because it was determined by physician that the patient had scabies.

SCABIES CLINICAL INDICATORS

A working knowledge of scabies clinical indicators is critical to avoid scabies treatment failures and outbreaks. The Authority has developed a graphic displaying the key elements of scabies

transmission, symptoms, diagnosis and control (Figure).

TRANSMISSION

Scabies is predominantly spread by direct skin-to-skin contact during patient care activities such as physical assessment or assisting with activities of daily living. Mites cannot jump or fly, but they can crawl about 2.5 cm per minute under the skin.^{9,10} Scabies can also be spread by indirect contact with fomites such as clothing, linens, and upholstered furniture used by people with crusted scabies.¹ Topical lotions or medications can serve as a reservoir for mites as they can survive up to seven days in oil-based solutions.¹¹

Once a fertilized female mite transfers to the host's skin by direct contact, she penetrates and tunnels under the surface layer of the skin and repeatedly deposits two to three eggs a day in her burrow during her two-month lifespan.^{1,12} The female mite is harbored in a small vesicle at the end of the burrow.¹ The egg larvae hatch in 3 to 4 days, surface, burrow, and feed on skin cells until they mature over 7 to 10 days, after which the fertilization and burrowing cycles repeat.^{1,2} Scratching the itchy skin can result in harboring mites under the fingernails, which then can spread the infestation to other parts of the body, new hosts, or fomites.

Table 1. Hospital and Nursing Home Scabies Cases

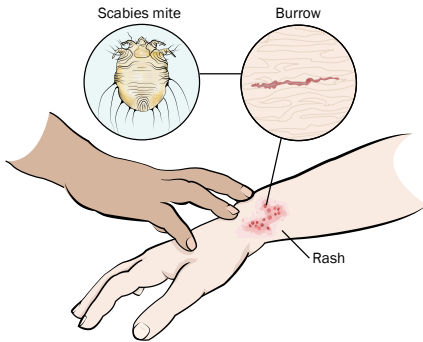
SETTING	TIME FRAME	NUMBER OF CASES	OUTBREAKS
Hospital inpatient medical, surgical, specialty, and psychiatric units, imaging, and laboratories*	June 2004 through November 2015	70	1 psychiatric unit outbreak for 3 total cases
Hospital outpatient, emergency department, and ultrasound*	June 2004 through November 2015	33	None reported
Ambulatory surgical facility*	June 2004 through November 2015	7	None reported
Nursing homes†	April 2014 through November 2015	484	37 outbreaks ‡

* Hospital and ambulatory surgical facility case reports found in PA-PSRS.

† Nursing homes began reporting scabies cases through PA-PSRS in April 2014.

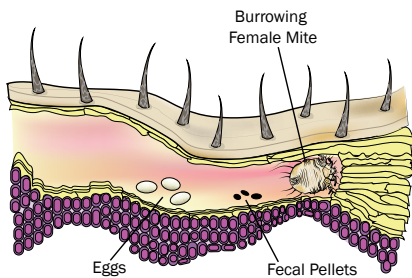
‡ Five of the 37 nursing home outbreaks totaled 272 cases.

Scabies Transmission, Symptoms, Diagnosis, and Control



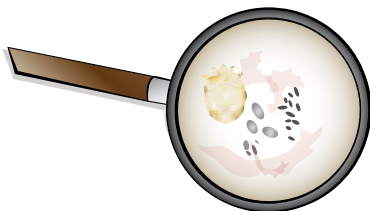
TRANSMISSION

Scabies are transferred from an infested host to a new host by skin-to-skin contact and in severe cases from infested clothing, bedding, or the environment.



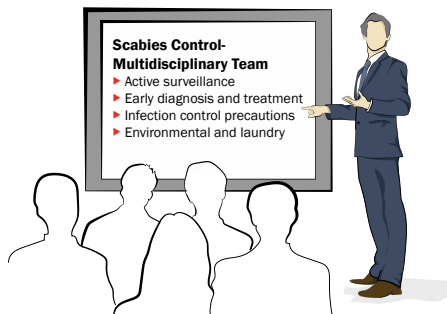
SYMPTOMS

Symptoms of raised rash and intense itching are caused by an allergic reaction to the mites, burrow, eggs, and fecal pellets under the skin.



DIAGNOSIS

Scabies mites, eggs, burrows, and fecal pellets can be identified microscopically from skin scrapings, needle removal of the mite, or by the adhesive tape test.



Scabies Control-Multidisciplinary Team

- ▶ Active surveillance
- ▶ Early diagnosis and treatment
- ▶ Infection control precautions
- ▶ Environmental and laundry

CONTROL AND PREVENTION

Scabies outbreaks can be controlled by early diagnosis, early concurrent treatment with scabicide and environmental and textile cleaning, contact prophylaxis, education, and communication as part of a written scabies outbreak control plan.

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Transmission can continue until the mites and eggs are killed by treatment, environmental disinfection, or after three to four days off the skin.¹ Persons with severe or crusted scabies can shed thousands of live mites into the environment.^{1,3}

Symptoms

A person infested with typical scabies usually presents with severe itching intensified at night, a generalized raised or blistered rash on the skin folds of fingers, buttocks, genitalia, breasts, wrists, elbows, and axilla, or lesions associated with burrows. According to the Centers for Disease Control and Prevention (CDC), the rash in bedbound patients may be more noticeable on patients' backs, buttocks, and legs.³ An allergic reaction to the mites, their saliva, eggs, or fecal material results in the rash and itching.⁵ Scabies mites are microscopic, but the burrows may be visible with a handheld magnifying glass as centimeter-long, tiny, grayish-white or red raised wavy lines under the skin.¹²

The first time a person is infested with scabies, he or she may have no symptoms during the four- to six-week incubation period but can still spread mites during this time.¹³ Individuals with previous scabies infestations are more sensitive and become symptomatic in one to four days. Delayed diagnosis or treatment and scratching, which opens a portal of entry for pathogens, may result in secondary skin infections such as bacterial skin infections, impetigo, cellulitis, or post-streptococcal glomerulonephritis.^{5,6}

Crusted scabies can manifest as hyperkeratotic nails and thick crusts or scales on the skin harboring thousands of scabies mites and eggs.⁶ These thick, sometimes fissured crusts generally involve the hands and feet but can be found elsewhere on the body.⁶ The presence of itching may be variable in persons with crusted scabies or altered immune response.¹⁰

Surveillance and Outbreak Criteria

A high suspicion of scabies is warranted in persons with persistent, undiagnosed rashes and itching, new complaints of rash and itching every four to six weeks, thick crusted skin surfaces, or if there is evidence of a common source of exposure to an active case.⁴ Surveillance and case findings are critical to determine the location and scope of an outbreak, the possible outbreak source person, its ongoing transmission, and the end of the outbreak; reporting and communicating with outside sources, such as the local health department, also is critical.

The New Jersey Department of Health has defined a scabies outbreak in a long-term care or residential facility as "one or more laboratory confirmed cases of scabies (via positive skin scraping), or at least two clinically suspected cases (clinically diagnosed and treated individuals) in residents, healthcare providers, visitors or volunteers within a four-week period of time."⁹ The Pennsylvania code of communicable and non-communicable diseases defines an outbreak as an unusual increase in the number of cases of a disease, infection or condition, whether reportable or not as a single case, above the number of cases that a person required to report would expect to see in a particular geographic area or among a subset of persons (defined by a specific demographic or other features).¹⁴

Diagnosis

Scabies can be diagnosed by the clinical manifestation; an ink test to identify a burrow; the examination of skin scrapings for mites, their eggs, or fecal matter using a microscope (dermatoscopy); or by an adhesive tape test to visualize mites.¹⁵⁻¹⁷ A negative skin scraping might not rule out active scabies because the small number of mites in a classic scabies case may make the burrows hard to visualize.³ In a 2011 systematic review of diagnostic

methods for scabies, Leung and Miller describe the key steps to perform an accurate skin scraping or burrow ink test.¹⁶ Katsumata and Katsumata described a simple method to detect scabies by transferring mites from the patient's skin on the sticky side of transparent adhesive tape to a slide, enabling microscopic visualization of mites moving around in the space between the slide and the tape. Detecting mites by this method is most effective when the tape is applied to the thin skin of the toes and fingers.¹⁷ For more information, see "Key Steps to Identify Scabies."

Scabies can be misdiagnosed as psoriasis, eczema, contact dermatitis, impetigo, insect bites, or non-specific dermatitis.¹⁵ The severity of the infestation may progress extensively before being noticed, because of the long incubation period in first-time cases or misdiagnosis and subsequent delay in treatment, which provides a significant opportunity to transmit the scabies mite to others. CDC recommends consulting with a dermatologist experienced in confirming the diagnosis of scabies, and in cases of crusted scabies, ensuring that a staff member is trained to perform a microscopic skin scraping for scabies mites and material.⁴

Treatment

Synchronous treatment is appropriate for the infested person, for those with close personal contact with an infested person in the previous four weeks, or in the case of crusted scabies, for those who have had contact with the linens or environment of the infested person.¹³ Prescription scabicides are used to kill scabies mites and their eggs.¹³ Carefully select a scabicide: some products may not be safe for children or pregnant women, may cause skin irritation, or may be neurotoxic. The advantages, disadvantages, and contradictions for specific medications and treatment regimens are detailed on the CDC scabies website.¹⁸

KEY DIAGNOSTIC STEPS TO IDENTIFY SCABIES

Burrow Ink TEST¹

- Identify the burrow using a handheld magnifying glass in an area not excoriated by scratching.
- Gently rub ink from a felt tip or fountain pen over a suspected burrow.
- Gently wipe off the excess ink with an alcohol swab.
- Visualize the burrow where the ink has been absorbed into the burrow tunnel.

Skin Scraping (Dermatoscopy)²

- Identify the burrow using a handheld magnifying glass or the burrow ink test in an area not excoriated by scratching.
- Prepare the skin site and the slide with a drop of mineral oil.
- Gently scrape the skin off the burrow with a blunt scalpel blade or the edge of the glass slide.

OR

- Use the tip of a sterile needle and a drop of mineral oil to remove the scabies mite from the end of its burrow.
- Place a cover slip over the slide and repeat for about 4 to 6 scrapings for each patient.
- Transfer the slide to the laboratory or have a trained person examine the slide under a microscope.

Adhesive tape TEST³

- Cut a section of strong transparent adhesive tape the same size as a glass slide.
- Press the strip of adhesive tape onto a suspected scabies lesion on the patient's skin.
- Wait several seconds, then pull tape off the skin.
- Transfer the adhesive side of the tape directly onto a glass slide.
- Use a microscope to visualize mites between the slide and the tape.

Notes

1. Leung V, Miller M. Detection of scabies: a systematic review of diagnostic methods. *Can J Infect Dis Med Microbiol* 2011;22(4):143-6.
2. Cahill CK, Rosenberg J, Schweon SJ, et al. Scabies surveillance, prevention, and control. *Ann Long Term Care* 2009 Apr 22;17(4):31-5.
3. Katsumata K, Katsumata K. Simple method of detecting *sarcoptes scabiei* var *hominis* mites among bedridden elderly patients suffering from severe scabies infestation using an adhesive-tape. *Intern Med* 2006;45(14):857-9.

Synchronous treatment with both an oral antiparasitic and a topical scabicide has been effective for cases of crusted scabies or failed treatment, and oral alone for cases of intolerance to topical solutions.^{1,13,18} Crusted scabies requires at least two treatments, about a week apart.⁴

Softening and removing scaly crusts from the skin and from under the nails enhances penetration of the scabicide. This can be accomplished by loosening the hardened skin with application of a keratolytic agent, brushing off the crusts, and trimming the nails and massaging

the scabicide under fingernails and toenails.^{10,18,19} Avoid skin-to-skin contact for at least eight hours after treatment.²⁰

Persistent itching may be present for several weeks after treatment as the dead mites, eggs, eggshells, and fecal pellets emerge from the burrows.^{9,13} If weekly skin assessments find persistent itching or new burrows more than two to four weeks after the last treatment, repeat treatment may be necessary.^{9,20} Suspect treatment failure when persistent, intensified or new lesions appear within two to four week of treatment. For more information, see “Key Factors is Scabies Treatment Failures.”

SCABIES OUTBREAK CONTROL PLAN

An outbreak control plan is essential to prevent the morbidity, potential mortality, and significant operational burden associated with a scabies outbreak. Outbreaks often result in the following:

- Unplanned use of scarce facility resources to manage infected patient
- Staff sick leave and overtime
- Additional healthcare supplies and cleaning expenses
- Lost revenue from temporary closures of affected units
- Irrational panic among staff

A written outbreak control plan is best coordinated with a multidisciplinary team. A robust plan includes developing and implementing measures for early detection and treatment of new scabies cases, using contact prophylaxis, employing infection and environmental controls, ensuring good communication, and providing education.²⁰ It is essential to review and confirm the effectiveness of outbreak-control activities after an outbreak has resolved.⁹ The Authority's accompanying Scabies Outbreak Control Checklist tool (<http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/Pages/home.aspx>) provides a structure to identify gaps in readiness plans,

KEY FACTORS IN SCABIES TREATMENT FAILURES

- Incorrect diagnosis.¹
- Failure to follow the topical scabicide directions for first and second applications.¹
- Insufficient penetration of scabicide into crusted lesions or under nails.¹
- Re-infestation due to continued exposure to other, active scabies cases.¹
- Failure to remove mites from linens and the environment.¹
- Failure of immunosuppressed patients to respond to treatment.²

Notes

1. Management of scabies in long-term care facilities, schools and other institutions. [internet]. Trenton (NJ): New Jersey Department of Health; 2014 Jul [accessed 2014 Jan 18]. [21 p]. Available from Internet: http://www.state.nj.us/health/cd/documents/faq/scabies_guidance.pdf
2. Cahill CK, Rosenberg J, Schweon SJ, et al. Scabies surveillance, prevention, and control. *Ann Long Term Care* 2009 Apr 22;17(4):31-5.

investigate scabies cases, and control outbreaks. Control measures are considered effective and the outbreak resolved when no new cases are identified within two six-week incubation periods or twelve weeks. This allows for weekly assessment and recognition of asymptomatic secondary cases while still in the incubation period.^{1,9}

Early Detection and Treatment

The following actions provide early detection and treatment:

- Institute heightened surveillance during admission assessments for rapid detection of symptoms and secondary infections.^{3,4,9}
- Confirm cases and outbreak definitions, and discuss control strategies with local or state health departments.^{4,6}
- Institute a line listing to track and identify the index case, trends, timelines, and locations for patient, staff, and volunteer or family cases.²⁰
- Use a line patient and staff listing to track outbreak parameters; one is available at: <http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/Pages/home.aspx>.
- Train a clinician to perform skin scrapings in the event of a persistent outbreak and ensure access to testing supplies.⁴
- Treat all infested persons and their asymptomatic contacts at the same time to avoid reinfestation.²⁰
- Furlough healthcare workers with symptoms of scabies until 24 hours after treatment. Continue the use of personal protective equipment (PPE) for a few days to be sure they are no longer infested.^{9,21}
- Provide prophylactic treatment for everyone who has had skin-to-skin contact with individuals with scabies or exposure to the environment of individuals with crusted scabies.^{4,20}
- Consider facility-wide mass prophylaxis for residents, staff, volunteers, and others, based on several factors:
 - The amount of time diagnosis, treatment, and isolation was delayed
 - The number of symptomatic or suspected cases
 - The mobility of patients and staff
 - Whether there are any cases of the highly transmissible crusted scabies^{1,20}
- Institute contact precautions for patient care, housekeeping, and laundry activities until 24 hours after treatment is started for individuals with scabies, and clean the environment.^{1,4,9}
- Provide clear descriptions about how to implement contact precautions for scabies; consider practicing job-specific steps in a clinical scenario or simulation exercise.
- Consider enhanced precautions for persons with crusted scabies, including separating from classic scabies cases, cohorting staff, and continuing contact precautions until successful treatment has been verified.⁴
- Synchronize environmental cleaning with treatment or prophylaxis.⁹
- Limit visitors or require use of PPE.²⁰
- Remove or kill scabies mites by collecting fabrics used in at least the last 3 days in a plastic bag, then wash and dry on the hot cycle (122 degrees Fahrenheit), dry clean, or remove from use or body contact for at least 72 hours.³
- Disinfect shared equipment such as wheel and shower chairs and blood pressure cuffs.⁹
- Thoroughly vacuum room, furniture, and carpet daily to remove contaminated skin cells shed from crusted scabies cases. Change vacuum bag daily.^{3,9}

Infection and Environmental Controls

The following actions provide infection and environmental control:

Communication and Education

To provide communication and education, take the following steps:

- Communicate job-specific information explaining scabies transmission, symptoms, surveillance, diagnosis, and treatment. Reinforce required



activities using educational modalities such as simulation exercises or posters and handouts of scabies fact sheets.²⁰

- Train and hold healthcare workers accountable for identifying, reporting, and documenting suspicious skin conditions.¹
- Establish a multidisciplinary process and accountable personnel to identify and notify contacts, institute visitor restrictions, and coordinate local and state health department and media contacts as necessary.^{9,20}
- Establish a relationship with a consultant dermatologist to provide information and dermatologic consultation to individuals with scabies or their contacts.^{1,9}

Limitations

Limitations of this study are that scabies may be under-reported in hospitals and

ASFs because the HAI event taxonomy in PA-PSRS does not include scabies infestations. In Pennsylvania, hospitals are obligated to report infections only to the CDC National Healthcare Safety Network (NHSN), which does not collect reports on scabies infestations. Additionally, scabies outbreak definitions vary from state to state. Finally, the nursing home reporting system captures criteria but not narrative information.

In terms of limitations in healthcare settings, in a setting such as nursing homes, it can be challenging to access a microscope or obtain a dermatology consult for timely diagnosis.

CONCLUSION

Pennsylvania hospitals, ASFs, and nursing homes have reported scabies cases, outbreaks, and delays in diagnosis, treatment, and isolation, as well as communication

failures through PA-PSRS event reports. Much of the morbidity, mortality, and operational disruption associated with scabies outbreaks is preventable. The most important risk-reduction strategies are timely and accurate identification, treatment, and isolation of scabies cases; environmental control; and development of a facility-specific outbreak control plan. For this reason, it is important to raise awareness and identify the gaps in a healthcare facility's ability to respond to scabies before an outbreak ensues. The Authority's Scabies Outbreak Control Checklist can be a useful tool to identify gaps in facility practices and to target resources and accountability for implementation of appropriate risk reduction strategies.

Acknowledgment

Edward Finley, BS, Senior Data Analyst, Pennsylvania Patient Safety Authority, provided data analysis expertise.

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PENNSYLVANIA PATIENT SAFETY ADVISORY

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