

Notes from the Field

Acanthamoeba Keratitis Cases — Iowa, 2002–2017

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Acanthamoeba is a ubiquitous protozoan that feeds on bacteria and yeast. Because of its ability to encyst in extreme environmental conditions, the organism is difficult to kill. Contact lens wearers exposed to any water source are at highest risk for developing *Acanthamoeba* keratitis (AK), a severe corneal infection that can result in painful blindness. Variable findings when patients seek treatment contribute to the underdiagnosis of AK, and the amoeba's resistance to killing makes AK a challenging infection to treat for ophthalmologists. The incidence of *Acanthamoeba* keratitis in the United States is estimated to be one to two new cases per 1 million contact lens wearers annually (1); approximately 16.7% of U.S. adults wear contact lenses (2). Among the estimated 2.42 million Iowa residents aged ≥18 years, including an expected 404,267 adult contact lens wearers (16.7%), 0.4–0.8 new AK cases per year would be expected in Iowa. However, the University of Iowa Hospitals & Clinics (UIHC), the only tertiary care center in Iowa, diagnosed 15 new AK cases in 2015, 14 of which were adults. Because of this apparent excess in occurrent cases, a retrospective investigation was performed to ascertain AK cases evaluated at UIHC during a 16-year period.

Electronic records were queried to identify patients with corneal infections treated at UIHC during 2002–2017. A confirmed AK case was defined as detection of *Acanthamoeba* using confocal microscopy or corneal scraping, which was analyzed by an ocular pathologist for amoebic cysts. Overall, 111 confirmed AK cases were identified, including 75 (67.6%) in Iowa residents. For the following reasons, it is unlikely that any Iowa AK cases defined using the criteria described are not included in this cohort: AK cannot be diagnosed empirically, and UIHC uses the only clinical ophthalmic confocal microscope in Iowa and employs the only ocular pathologist in the state.

During 2002–2017, Iowa's adult population increased 7.3%, from 2.25 million to 2.41 million persons*; 27,539 (16.7%) of the new 164,905 Iowa residents aged ≥18 years were expected to have been contact lens wearers. This increase

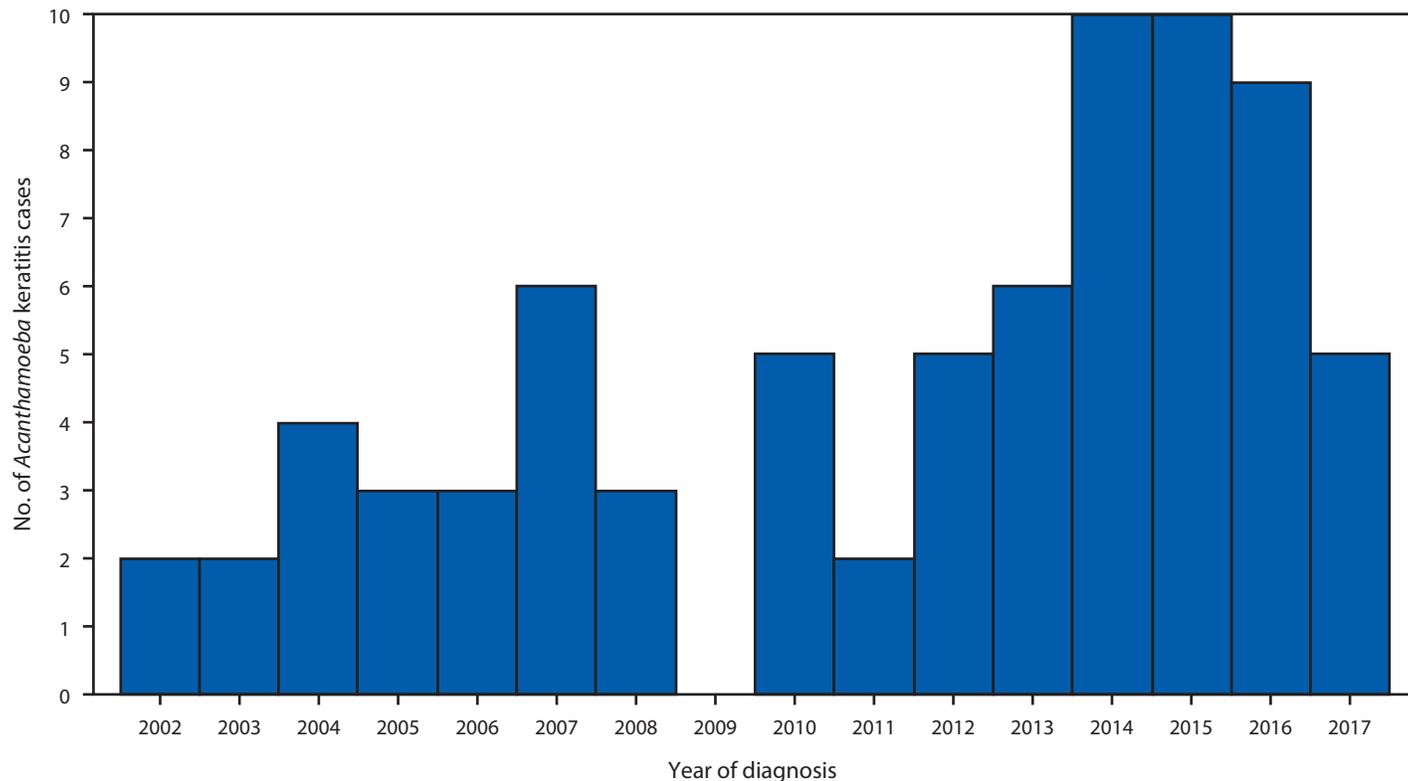
in the population at risk for AK (i.e., one to two new cases per 1 million contact lens wearers annually) corresponds to an expected increase of 0.03–0.06 new AK cases in 2017, compared with 2002. However, among all Iowa residents, the average number of new AK cases per year increased from 2.9 cases during 2002–2009 to 6.5 cases during 2010–2017. The number of new AK cases doubled among residents during 2012–2014 (Figure).

Among Iowans with confirmed AK, the median age was 32 years (range = 8–80 years), and 40 (53.3%) patients were women. Six (8%) patients were aged <18 years. Most patients had at least one risk factor, including contact lens wear (63; 84.0%), corneal injury (12; 16.0%), or eye exposure to organic material (e.g., dirt or algae) (12; 16.0%). Among the 63 affected contact lens wearers, 54 (85.7%) reported inadequate contact lens hygiene, and the majority reported recent water exposure, including swimming in lakes or rivers while wearing contacts (14; 22.2%), showering while wearing contacts (11; 17.5%), or cleaning contacts with tap water (eight; 12.7%). Twenty-one (33.3%) patients reported wearing contacts while sleeping, and 19 (30.2%) wore their contacts for longer than recommended by the manufacturer. AK was most prevalent in the summer (23 cases; 30.7%), followed by fall (21; 28.0%), winter (16; 21.3%), and spring (15; 20.0%). The average interval from symptom onset to diagnosis was 1.2 months (range = 0–4.4 months). Late diagnoses contributed to poor vision, and 31 Iowans with AK (41.3%) were legally blind (visual acuity <20/200) in the affected eye at first evaluation. Thirty-five (46.7%) patients ultimately required surgical intervention because of *Acanthamoeba* resistance to medical therapy.

AK is a sight-threatening condition, and outbreaks have been linked to specific contact lens solutions (3), hard water with lime scale (4), and biofilm contamination of domestic and recreational water (5,6). The expanding problem of algal bloom and nutrient pollution in Iowa waters might also be contributing to an increase in pathogenic *Acanthamoeba* species and the rising number of AK cases (6). Although this investigation was limited by its retrospective design and analysis of data obtained from a single center, UIHC is likely to evaluate most AK cases in Iowa. To prevent contact lens–related infections, including AK, CDC recommends that contact lens users not use tap water to clean contacts, swim or shower while wearing contacts, wear contacts for longer than recommended, or wear contacts while sleeping (7).

*U.S. Census Bureau estimates. Percentage change in population is calculated based on the unrounded population.

FIGURE. Confirmed cases* (N = 75) of *Acanthamoeba* keratitis diagnosed in Iowa residents, by year of diagnosis — University of Iowa Hospitals & Clinics, 2002–2017



* Detection of *Acanthamoeba* by confocal microscopy or corneal scraping among patients with corneal infection treated at University of Iowa Hospitals & Clinics during 2002–2017.

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