Table. Age groups, median ages, and case-fatality ratios for influenza A (H5N1) case-patients, by influenza season, Egypt*

Influenza season, August–July	No. case-patients by age group, y						Total no. case-patients	Median age, y	Case-fatality ratio
	1–8	9–20	21–30	31–40	41–74	≥75			
2005–06	4	4	3	2	0	1	14	18.0	42.8
2006–07	13	5	4	2	0	0	24	6.5	37.5
2007–08	3	2	5	1	1	0	12	23.5	58.3
2008–09	28	1	1	3	0	0	33	3.0	15.1
Total	48	12	13	8	1	1	83	—	—

*Age at date of clinical sign onset; data from the World Health Organization (*2*).

among confirmed infected persons. From 2006 through 2008, the annual CFR for influenza A (H5N1) in Egypt ranged from 36% to 55% (*3*). Since January 1, 2009, the CFR in Egypt has been 11%. The recent increases in infections among children coupled with a decrease in the CFR in the most recent 12-month period suggests that the strain of influenza A virus (H5N1) now circulating in Egypt may be becoming less virulent as it continues to spread among young children, a segment of the population that is highly vulnerable to influenza infections (*4*,*5*).

Alan Schroedl

Author affiliation: Anthrometrix Corporation, Salt Lake City, Utah, USA

DOI: 10.3201/eid1601.090560

References

1. Johnston C. Interview—concerns arise over symptomless Egypt bird flu cases. Reuters AlertNet, 08 Apr 2009 [cited 2009 Sep 17]. Available from http://www.alertnet.org/thenews/newsdesk/L7467886.htm
2. World Health Organization. Situation updates—avian influenza [cited 2009 Sep 17] Available from http://www.who.int/csr/disease/avian_influenza/updates/en/index.html
3. World Health Organization. Cumulative number of confirmed human cases of avian influenza A/(H5N1) reported to WHO [cited 2009 Nov 9]. Available from http://www.who.int/csr/disease/avian_influenza/country/cases_table_2009_09_24/en/index.html
4. Bhat N, Wright JG, Broder KR, Murray EL, Greenberg ME, Glover MJ, et al. Influenza-associated deaths among children in the United States, 2003–2004. N Engl J Med. 2005;353:2559–67. DOI: 10.1056/NEJMoa051721
5. Izurieta HS, Thompson WW, Kramarz P, Shay DK, Davis RL, DeStefano F, et al. Influenza and the rates of hospitalization for respiratory disease among infants and young children.. N Engl J Med. 2000;342:232–9. DOI: 10.1056/NEJM200001273420402

Address for correspondence: Alan Schroedl, Anthrometrix Corporation, 2359 Dayspring Lane, Salt Lake City, UT 84124, USA; email: aschroedl@anthrometrixcorp.com

Imported Chikungunya Virus Infection

To the Editor: Chikungunya is a disease caused by an arboviral alphavirus transmitted to humans by *Aedes* mosquitoes (*Aedes aegypti*, *Ae. albopictus*). Symptoms include fever, myalgia, rash, and joint pain (which can last for several months) (*1*). During the 2005–2006 epidemics on Reunion Island, clinical manifestations such as severe hepatitis, severe maternal and fetal disease, and meningoencephalitis not described previously were observed (*2*). Occurring in an immunologically uninfected population, this outbreak spread quickly, infecting approximately one third of the population (266,000 of 775,000 inhabitants) (*2*). The case-fatality rate on Reunion Island was estimated to be 1/1,000 cases, with excess deaths observed mainly among persons ≥75 years of age (*3*).

Chikungunya disease is endemic to western, central, eastern, and southern Africa; on Indian Ocean and west Pacific Ocean islands; and in Southeast Asia (*1*). Before 2005–2006, no outbreak of this disease had been described on islands in the Indian Ocean (Comoros, Mayotte, Madagascar, Reunion Island, Mauritius, and Seychelles). Since the epidemic on Reunion Island, many imported cases caused by this arbovirus have been reported elsewhere in areas where the disease is not endemic, particularly in Europe and the United States.

The main competent vector of chikungunya virus, a mosquito, *Ae. albopictus*, is indigenous to Southeast Asia and some islands of the western Pacific and Indian Ocean. The mosquito spread to the eastern Pacific, the Americas, Central Africa (Nigeria, Cameroon, Equatorial Guinea and Gabon), Europe, and the Middle East (*4*,*5*). Entomologic studies have shown that *Ae. albopictus* mosquitoes can now be found in the southeastern part of the United States, Mexico, Central and South America, the Caribbean, the Middle East, Japan, and southern Europe (Spain, Italy, Bosnia-Herzegovina, Croatia, France, Greece, the Netherlands, Serbia and Montenegro, Slovenia, Switzerland, and Albania) (*4*,*6*). This mosquito has also been intercepted in Australia's seaports and is now established in northern Queensland (*7*).

Ae. aegypti mosquitoes are indigenous to Africa and disseminated around the tropical and subtropical regions. The southeastern United States, the Middle East, Southeast Asia, Pacific and Indian islands, and northern Australia are also infested by this mosquito. In continental Europe, it

has been documented in southern regions but today seems to no longer to be present there (*8*).

Climate change, increasing globalization, and ease of travel could favor the continuing spread of mosquitoes to nonindigenous habitats, expanding the number of regions in the world where local transmission of vector-borne disease could occur. In these countries where competent vectors are present, patients coming from disease-endemic areas at an early stage of infection may import the virus and be responsible for locally acquired mosquito-transmitted cases of chikungunya. The risk for local transmission in these countries is not simply theoretical, as shown by the epidemic of chikungunya in the county of Emilie-Romagna, Italy, in which 205 cases were identified between July 4 and September 27, 2007 (*9*). In the United States, such secondary transmission of vector-borne disease has also been observed with malaria (*10*).

To determine regions of the world at risk for an epidemic of chikungunya virus, we first listed the imported chikungunya cases (i.e., cases diagnosed in nonendemic areas) reported around the world. A literature review was undertaken on Medline by Pubmed and websites provided by the World Health Organization, Eurosurveillance, European Center for Disease Prevention and Control, Health Protection Agency (United Kingdom), Institut de Veille Sanitaire (France), and the Centers for Disease Control and Prevention (United States) were searched for information on imported chikungunya cases. Data were then mapped and compared with the known and theoretical geographic distributions of *Ae. albopictus* and *Ae. aegypti* mosquitoes around the world (online Appendix Figure, available from www.cdc.gov/EID/content/16/1/162-appF.htm) (*4*–*8*). This figure shows that imported cases were reported in many countries where mosquito vectors for chikungunya virus are well established.

These facts underscore the need for clinicians to consider the possibility of chikungunya disease in patients who experience acute unexplained fever with joint pain and live in regions where mosquito vectors are established. The presence of imported cases and well-established vectors also confirms the need for an active surveillance system; early detection of unexpected new diseases by physicians will enable the timely implementation of suitable control measures that can interrupt the transmission chain.

Acknowledgments

We thank Julian Druce, Matthias Niedrig, Thomas Löscher, and Evelyn Depoortere for help in manuscript preparation.

This work was funded by the French Institute for Health and Medical Research.

Man-Koumba Soumahoro, Didier Fontenille, Clément Turbelin, Camille Pelat, Anders Boyd, Antoine Flahault, and Thomas Hanslik

Author affiliations: Université Pierre et Marie Curie, Paris, France (M.-K. Soumahoro, C. Turbelin, C. Pelat, A. Boyd); Institut National de la Santé et de la Recherche Médicale, Paris (M.-K. Soumahoro, C. Turbelin, C. Pelat, A. Boyd, A. Flahault, T. Hanslik); Research Institute for Development, Montpellier, France (D. Fontenille); French School of Public Health, Rennes, France (A. Flahault); Hôpital Ambroise Paré, Boulogne Billancourt, France (T. Hanslik); and Assistance Publique Hôpitaux de Paris, Paris (T. Hanslik)

DOI: 10.3201/eid1601.080776

References

1. Powers AM, Logue CH. Changing patterns of chikungunya virus: re-emergence of a zoonotic arbovirus. J Gen Virol. 2007;88:2363–77. DOI: 10.1099/vir.0.82858-0
2. Pialoux G, Gauzere BA, Jaureguiberry S, Strobel M. Chikungunya, an epidemic arbovirosis. Lancet Infect Dis. 2007;7:319–27. DOI: 10.1016/S1473-3099(07)70107-X
3. Josseran L, Paquet C, Zehgnoun A, Caillere N, Le Tertre A, Solet JL, et al. Chikungunya disease outbreak, Reunion Island. Emerg Infect Dis. 2006;12:1994–5.
4. Gratz NG. Critical review of the vector status of *Aedes albopictus*. Med Vet Entomol. 2004;18:215–27. DOI: 10.1111/j.0269-283X.2004.00513.x
5. Paupy C, Delatte H, Bagny L, Corbel V, Fontenille D. *Aedes albopictus*, an arbovirus vector: from the darkness to the light. Microbes Infect. 2009; 1:1177–85.
6. Scholte E, Schaffner F. Waiting for the tiger: establishment and spread of the *Aedes albopictus* mosquito in Europe. In: Takken W, Knols B, editors. Emerging pests and vector-borne diseases in Europe. Wageningen (the Netherlands): Wageningen Academic Publishers; 2007. p. 241–60.
7. Russell RC, Williams CR, Sutherst RW, Ritchie SA. *Aedes* (*Stegomyia*) *albopictus*—a dengue threat for southern Australia? Commun Dis Intell. 2005;29:296–8.
8. Fontenille D, Failloux A, Romi R. Should we expect chikungunya and dengue in Southern Europe? In: Takken W, Knols B, editors. Emerging pests and vector-borne diseases in Europe. Wageningen (the Netherlands): Wageningen Academic Publishers; 2007. p. 169–84.
9. Rezza G, Nicoletti L, Angelini R, Romi R, Finarelli AC, Panning M, et al. Infection with chikungunya virus in Italy: an outbreak in a temperate region. Lancet. 2007;370:1840–6. DOI: 10.1016/S0140-6736(07)61779-6
10. Centers for Disease Control and Prevention. Local transmission of *Plasmodium vivax* malaria—Palm Beach County, Florida, 2003. MMWR Morb Mortal Wkly Rep. 2003;52:908–11.

Address for correspondence: Man-Koumba Soumahoro, Institut national de la santé et de la recherche médicale, Unité Mixte de Recherche en Santé 707, Faculté de Médecine Pierre et Marie Curie, Site Saint-Antoine/Porte 808, 27 rue Chaligny, 75571 Paris CEDEX 12, France; email: soumahor@u707.jussieu.fr