The following message was sent to you through the Alaska Public Health Alert Network (AK PHAN). Please share this information with others who may be interested.

Note: Contact information for the Alaska Section of Epidemiology can be found at the end of this message.

Alaska Public Health Advisory

January 5, 2015

Six Cases of Acute Myocarditis in Children — Alaska, 2014

Background

Acute myocarditis is a rare cause of cardiac disease in children, and is usually viral in etiology. Although an accurate estimate of the incidence of pediatric myocarditis in children is difficult due to lack of sensitive and specific diagnostic tests, reports suggest an annual incidence of 1 per 100,000 [1]. In addition to enterovirus and adenovirus, recent studies utilizing endomyocardial biopsy (EMB) implicate parvovirus B19 and human herpesvirus 6 as common etiologies of acute myocarditis in children [2,3]. From June through November 2014, pediatricians at the Alaska Native Medical Center (ANMC) identified six children with myocarditis.

The purpose of this advisory is to:

1. To outline the clinical characteristics of the cases; and

2. To alert health care providers to this cluster to facilitate further case finding.

Cases

Six clinical cases of acute myocarditis in Alaska Native children were identified by ANMC hospitalists from June through November 2014 (Table). Two each were identified in Southcentral (Anchorage), Southwest, and Northern Alaska. All six of the patients had upper respiratory (n=5) or gastrointestinal (n=1) symptoms that preceded cardiac symptoms by a few days to over a month. All children had cardiomegaly. One child died of overwhelming cardiac failure shortly after presentation with a cause of death listed as lymphocytic myocarditis; all other children are recovering, although two children required out-of-state transfer to a cardiac center. One child had trisomy 21 and hypothyroidism, and another had asthma and recurrent bronchiolitis. Nasal swab samples from four of the children tested positive for viruses by polymerase chain reaction (PCR; Table). Cardiac troponin levels were elevated in one of the four children tested; B-type natriuretic peptide (BNP) levels ranged from 27,792 to >70,000 pg/ml in the four children tested.

	Sex, Age (in yrs)	Onset month (in 2014)	Echocardiogram results	Ejection fraction (%)	Results of PCR testing with RVP*	Outcome
1	F, 12	Nov	Dilated LV/RV, poor contractility	9-18	Negative	Persistent cardiomyopathy on cardiac meds
2	F, 1	Nov	Dilated LV, depressed LV contractility	25-26	Flu (H3), Rhino/entero† Parvo	Referred out of state; recovering on cardiac meds
3	M, 1	Sept			Para III, Adeno C	Death
4	M, 1	Jul	Dilated LV, decreased function	32	Negative	Recovering – on cardiac meds
5	F, 2	Jun	Dilated LV, poor function	14	Rhino/entero†	Recovering – on cardiac meds
6	M, 2	Jul	Dilated LV,	25	Rhino/entero†, Adeno	Referred out of state; improved on cardiac meds

Abbreviations: LV – left ventricle, RV – right ventricle, RVP – respiratory virus panel, flu – influenza, rhino – rhinovirus, entero – enterovirus, parvo – parvovirus, para – parainfluenza, adeno – adenovirus.

*The ANMC Respiratory Virus Panel (RVP) uses PCR testing to detect any of 17 virus and 3 bacterial targets. A positive result does not necessarily correspond to clinical illness. Multiple targets might be positive in a single specimen.
†Rhino/entero is a conserved target for both viral genera. Additional testing is needed to differentiate between rhinovirus and enterovirus.

Diagnosis and Treatment

Clinical diagnosis of acute myocarditis is difficult because of variable clinical presentation. Symptoms may initially include flu-like, upper respiratory, or gastrointestinal symptoms, and progression to cardiac symptoms, including fatigue, dyspnea, palpitation, malaise, and atypical chest discomfort, after days or weeks. The natural history of acute myocarditis can include early death due to fulminant myocarditis, ventricular arrhythmias, long-term evolution to dilated cardiomyopathy, and complete recovery. Although specific markers for acute myocarditis in routine blood studies are lacking, cardiac enzymes are usually elevated--cardiac troponins indicate myocyte injury, and elevated BNP is associated with heart failure [4]. Auto-antibodies against contractile structures may play a role in myocyte injury.

The differential diagnosis for acute viral myocarditis includes other infectious causes of myocarditis, acute myocardial infarction, giant cell myocarditis, and eosinophilic myocarditis. The diagnostic gold standard is EMB. Treatment is supportive care for heart failure [2]. Recent studies show some benefit of immunomodulatory therapy in a limited group of patients with specific diagnosis; antiviral therapy has been identified as a possible approach, but evidence-based guidelines in favor of these specific treatment guidelines are lacking [3].

Clusters of myocarditis have been identified and related to specific viral etiologies, including a cluster of eight neonates with closely related strains of coxsackie B1 [5]. This current cluster of six children with myocarditis in Alaska over a 6-month period appears to be a high incidence; however, no single common pathogen was identified in all or most of the patients.

Conclusion

Alaska providers have identified six cases of acute myocarditis in children from three different regions of the state. No specific consistent viral etiology has been identified among the children and cases occurred over a 6-month time period. The Alaska Section of Epidemiology is collaborating with health care providers and subject matter experts at the Centers for Disease Control and Prevention to rapidly identify additional cases and facilitate viral testing to determine if this cluster represents an outbreak of illness linked to a particular circulating virus.

Recommendations

1. Clinicians caring for a suspected case of acute myocarditis in a child should obtain a detailed history and obtain nasopharyngeal (NP) samples for respiratory virus (including enterovirus, adenovirus and parvovirus) testing by PCR. Providers should submit acute NP samples to the Alaska State Virology Laboratory. Additionally, because serologic testing might provide supportive evidence in identifying a viral etiology, clinicians should consider obtaining acute sera samples which might be useful based on initial PCR results.

2. Providers are asked to notify the Section of Epidemiology (907-269-8000) about suspected pediatric cases of acute myocarditis. Updates to this cluster investigation will be disseminated as available.

References

1. Levine MC, Klugman D, Teach SJ. Update on myocarditis in children. *Curr Opin Pediatr* 2010;22(3):278-83.

2. Dennert R, Crijns HJ, Heymans S. Acute viral myocarditis. *Eur Heart J*. 2008;29:2073-82.

3. Mahrholdt H, Wagner A, Deluigi CC et al. Presentation, patterns of myocardial damage, and clinical course of viral myocarditis. *Circulation* 2006;114:1581-90.

4. McLean AS, Huang SJ. Cardiac biomarkers in the intensive care unit. *Ann Intensive Care* 2012;2:8.

5. Verma NA, Zheng XT, Harris MU et al. Outbreak of life-threatening coxsackievirus B1 myocarditis in neonates. *Clin Infect Dis* 2009;59:759-63.

Acknowledgements

Contributed by: Rosalyn Singleton, MD, Alaska Section of Epidemiology, Amie Wu, MD, Alaska Native Medical Center, and James Christiansen, MD, Providence Alaska Medical Center.

You are subscribed to the AK Public Health Alert Network for the Alaska Department of Health and Social Services. This information has recently been updated, and is now available.
