Testing for Infectious Diseases in Sudden Unexpected Infant Death: A Survey of Medical Examiner and Coroner Offices in the United States

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Objectives To determine interoffice variability in routinely performed sudden unexpected infant death (SUID) postmortem studies for infection and to assess availability and perceived utility of various tests of infectious diseases.
Study design Online surveys were sent to all 154 offices of US medical examiners and coroners serving populations >300 000 people. Surveys included a set of potential laboratory tests for infectious disease. Respondents were asked to select which tests were available in their offices, and which tests were performed routinely in SUIDs vs which tests should be performed routinely.
Results Of the 45 complete responses, 4.4% did not routinely perform histology, 8.9% did not routinely perform viral studies (ie, culture or molecular diagnostics), 22.2% did not routinely perform blood cultures, 26.7% did not routinely perform lung bacterial cultures, and 44.4% did not routinely perform cerebrospinal fluid cultures.
Conclusions Our findings suggest that there is considerable interoffice variability with testing for infectious diseases in SUIDs. This appeared to be largely the result of a perceived lack of testing utility rather than a lack of test availability. Evidence-based practice guidelines regarding the interpretation of microbial testing results, as well as common testing protocols/algorithms, may lead to more accurate and standardized data, thus improving SUID investigation and surveillance. *(J Pediatr 2015;167:178-82)*.

Each year approximately 4000 infants die suddenly and without immediately apparent cause in the US.[1] These are classified as sudden unexpected infant deaths (SUIDs). Causes of death that remain unexplained despite thorough investigation including autopsy may be designated as sudden infant death syndrome. Both the Centers for Disease Control and Prevention (CDC) and the National Association of Medical Examiners (NAME) have issued recommendations regarding the scope of the scene investigation, medical history review, and autopsy studies that are required in such cases.[2,3] In general, the trend has been towards greater standardization and documentation. Among the reasons for standardization are improvement of the quality and completeness of investigations, more accurate and consistent data tracking, and increased knowledge and identification of strategies to reduce SUIDs.[4] To date, there is no commonly accepted protocol or algorithm for SUID testing for infectious diseases in the US, although various models have been proposed.[5,6] Microbiologic studies can be an important component of SUID investigations, because up to 20% of such deaths subsequently are determined to be to the result of infectious diseases after comprehensive postmortem examination.[7] We aimed to determine what microbiologic studies are performed routinely in offices of US medical examiners/coroners in cases of SUIDs and assess whether factors such as test availability or perceived test utility adversely impact test use.

Methods

A survey of US medical examiner and coroner (ME/C) offices was conducted via on-line survey software (SurveyMonkey; www.surveymonkey.com). Surveys were sent to all US ME/C offices serving populations >300 000 people (total: 154 surveys). All authors were blinded to the identities of individual respondents. Respondents were queried regarding testing for infectious diseases in instances of SUID. The survey included a set of potential laboratory tests for infectious diseases; respondents were asked to select which of these tests were available in their offices, which of these tests were performed routinely in SUIDs in their offices, and which tests (in their opinion) ought to be performed in SUIDs. Standard office demographic information, such as type of medicolegal jurisdiction, NAME accreditation status, autopsy case load, staff numbers, and population served also was requested. The

CDC	Centers for Disease Control and Prevention
CSF	Cerebrospinal fluid
ME/C	Medical examiner and coroner
NAME	National Association of Medical Examiners
SUID	Sudden unexpected infant death

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respondents were allowed a free-text section for comments on the survey. Only fully completed surveys were included in analyzed aggregate data.

Results

Survey responses were received from a total of 54 of 154 offices (35%). Nine of these surveys (9/54; 16.7%) were incomplete, and were thus excluded from further analysis. Of the remaining 45 offices, more than one-half were NAME accredited (26/45; 57.8%), and the majority were composed of medical examiner (37/45; 82.2%) rather than coroner or combined ME/C jurisdictions (Table I). Jointly, the jurisdictions responding with completed surveys performed more than 48 000 autopsies annually, were staffed by a total of 210 full-time and 35 part-time pathologists, and represented a base population serving over 40 000 000 people (Table I).

Histologic sampling was the most common study performed (43/45, 95.6%; Table II). Of the 2 offices that did not submit histologic sections routinely, access to a histology laboratory was not the limiting factor as 100% of offices reported having services available. Histologic studies such as routine microorganism stains (eg, Gomori methenamine silver or acid fast bacilli stain) were performed rarely by any respondents (3/45; 6.7%), although the majority of offices did report access (41/45; 91.1%). A similar trend was seen with immunohistochemical stains for infectious organisms (eg, herpes simplex virus or cytomegalovirus) in which the majority of offices had access to stains (33/45; 73.3%), but none (0.0%) performed them routinely. Histopathologic examination by a specialist such as neuropathologist or hematopathologist was available at the majority of offices (39/45 and 30/45, respectively). A formal neuropathologic examination (ie, formalin fixation with neuropathologic consultation) was performed routinely in one-third of offices (15/45; 33.3%), and a hematopathologic examination was performed routinely in one-fifth (9/45; 20.0%).

Table I. Summary of agency data from 45 completed survey responses

Jurisdiction	
County	76%
State	22%
City	2%
Type of the medicolegal system	
Medical Examiner	82%
Coroner-Sheriff/Coroner	14%
ME/C	4%
NAME accredited agency	58%
Type of agency	
Independent/Stand Alone	36%
Department of Justice/Public Safety	16%
Other	22%
Department of Health/Public Health	22%
Academic Center	4%
Number of pathologists (full time/part time)	210/35
Approximate population of jurisdiction	
Between 300 000 and 1 000 000	47%
Greater than 1 000 000	53%
Approximate statutory jurisdictional autopsies performed in 1 year	48 466

Table II. Survey results of autopsy studies that are available, routinely performed, and should be performed in the investigation of SUIDs (n = 45)

Autopsy studies in SUID investigations	Routinely performed	Should be performed	Available
Histology	95.6%	93.3%	100.0%
Neuropathology (by neuropathologist)	33.3%	33.3%	86.7%
Bone marrow examination	20.0%	24.4%	66.7%
Aerobic/anaerobic blood culture	77.8%	73.3%	95.6%
Culture for virus			97.8%
Tracheal/bronchial swab	55.6%	48.9%	-
Tissue culture	24.4%	20.0%	-
Viral molecular testing	11.1%	6.7%	53.3%
Bacterial swab culture			95.6%
Bacterial lung swab	37.8%	28.9%	
Bacterial pharynx swab	17.8%	8.9%	
Bacterial middle ear swab	4.4%	2.2%	
Bacterial tissue culture			86.7%
Lung tissue	35.6%	28.9%	-
Splenic tissue	22.2%	13.3%	-
Mycobacterial culture	4.4%	6.7%	86.7%
Routine CSF testing			95.6%
CSF gram stain	24.4%	15.6%	-
CSF culture	55.6%	57.8%	-
CSF latex agglutination test	4.4%	4.4%	-
CSF molecular studies	0.0%	0.0%	-
Stat CSF testing	None	none	48.9%
Stat CSF gram stain	8.9%	6.7%	-
Stat CSF latex agglutination test	4.4%	4.4%	-
Stat CSF molecular studies	0.0%	0.0%	-
HIV testing	6.7%	4.4%	84.4%
Routine microorganism stain (eg, GMS)	6.7%	4.4%	91.1%
Immunohistochemical stain (eg, HSV)	0.0%	4.4%	73.3%

GMS, Gomori methenamine silver; *HSV*, herpes simplex virus.

In the majority of offices, access to bacterial aerobic/anaerobic blood cultures was available (43/45; 95.6%) and such studies were performed routinely in 35 of 45 offices (77.8%). Likewise, access to bacterial swab cultures, and (to a lesser degree) bacterial tissue cultures, was available at the majority of offices (43/45 and 39/45, respectively). Bacterial respiratory cultures were performed routinely in 73.3% of offices, but the method varied; approximately one-half preferred the use of lung swabs (17/45; 37.8%), and the remainder (16/45; 35.6%) preferred lung tissue cultures. Other bacterial studies, such as pharyngeal/middle ear swabs or splenic tissue culture, were performed less frequently. Viral cultures were available at almost all (44/45; 97.8%) offices. As with bacterial cultures, the method used varied; viral tracheal/bronchial swabs were preferred by 25 of 45 (55.6%) of respondents, and viral tissue cultures were preferred by 11 of 45 (24.4%). Newer viral molecular testing methods (eg, respiratory virus polymerase chain reaction panel) were available at only slightly more than one-half of offices (24/45; 53.3%) and were performed only routinely in 5 of 45 offices (11.1%).