

ORIGINAL ARTICLE

Investigation of unexplained infant deaths in Jerusalem, Israel 1996–2003

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Background: Sudden infant death syndrome (SIDS) is a diagnosis of exclusion that may be assigned only after investigations including a forensic autopsy are performed to exclude possible organic and environmental causes of death. Israeli society is influenced by the Jewish and Islamic faiths, which permit autopsy only under selected circumstances. Against this background, we carried out a study to determine what examinations are performed to investigate unexplained infant deaths in Jerusalem, Israel.

Methods: We examined hospital, Ministry of Health and Ministry of Interior records of unexplained infant deaths in the Jerusalem district from the years 1996–2003.

Results: Ninety six cases were identified from all sources. Forty nine (51%) infants were brought to a hospital at or near the time of death. Studies to determine the cause of death were performed in 54% of cases for which medical records were available for review. These studies included bacterial cultures (44%), skeletal surveys (12%), computerised tomography (3%) and metabolic studies (3%). Only one forensic autopsy was performed, and in no instance was the death site examined by medical personnel. There was a high rate of retrospective review by district health physicians. The most frequently assigned cause of death was SIDS.

Conclusions: The capacity of public health officials and forensic pathologists to investigate unexplained infant deaths is strongly affected by the legal, religious and political milieu in which they work. Efforts should be made to develop socially acceptable methods of improving the quality of infant death investigations in Jerusalem.

Sudden infant death syndrome (SIDS) is the most common cause of infant death following the neonatal period in economically developed countries. The specific cause of SIDS remains unknown and therefore it remains a diagnosis of exclusion that is assigned after possible identifiable organic or environmental causes of death have been searched for and excluded.^{1,2} A widely used case definition requires a clinical history that death occurred during sleep, evaluation of the clinical history and circumstances of death and examination of the death scene, and a full forensic autopsy.³ Accordingly, effective investigation of unexplained infant deaths requires a team approach involving forensic and paediatric pathologists, paediatricians, law enforcement personnel and paramedical services. Autopsies are required after unexplained deaths in most jurisdictions in Ireland,⁴ Great Britain and the United States.⁵ Throughout the United States, teams have been established to conduct reviews of unexplained infant deaths, which often include a death scene investigation.⁶

Israeli society in general, and Jerusalem society in particular, are heavily influenced by Judaism and Islam, religions that permit autopsy only under selected circumstances. Furthermore, autopsy after an unexplained infant death is mandated under Israeli law only when an unnatural cause of death is suspected. Against this background, we performed a study to examine how recent infant deaths whose cause was not apparent from the clinical history and physical findings were investigated in Jerusalem.

METHODS

We reviewed the medical records of all infants between 1 and 12 months of age presenting to emergency departments from 1996 to 2003 in western Jerusalem who were either dead on arrival or were not resuscitated successfully. In 2003, metropolitan Jerusalem had a population of 803 100 people. There were 22 483 live births, of whom two thirds were born to

fathers self-identified as Jews and one third to fathers self-identified as Arabs.⁷ Records were retrieved by computerised search of hospital databases, and supplemented with and compared to infant mortality records based on reports made to the Israel Ministry of Health (MOH). Infants with underlying life-threatening conditions or who died of bacterial infection or non-inflicted trauma were excluded from analysis. We made no attempt to obtain police records. When available, MOH records were used to confirm the place and official cause of death.

Data were maintained anonymously and no attempt was made to contact families. The study received written exemption from review by the local human subjects committee.

RESULTS

During the 8 year period surveyed, we identified a total of 96 infant deaths whose cause could not be ascertained based on initial history and physical examination, yielding an annual case prevalence of approximately 6/10 000 births. Fifty two of the infants were of Arab origin and 44 were of Jewish origin. The distribution of cases according to month and age is shown in fig 1. Seventy three deaths occurred during the winter months between October and March. Of 94 infants for whom age at the time of death could be determined, 26 (28%) were aged 6 months or more.

One forensic autopsy was performed. In no instance was the death scene examined by medical personnel.

We identified documentation that the dead child was brought to a hospital in 49 (51%) cases. Thirty four records were available for review. Medical investigations performed to ascertain the causes of death are summarised in table 1.

Eighty seven (91%) of the 96 cases were reported to the MOH, and most were investigated by a physician with training

Abbreviations: MOH, Ministry of Health; SIDS, sudden infant death syndrome

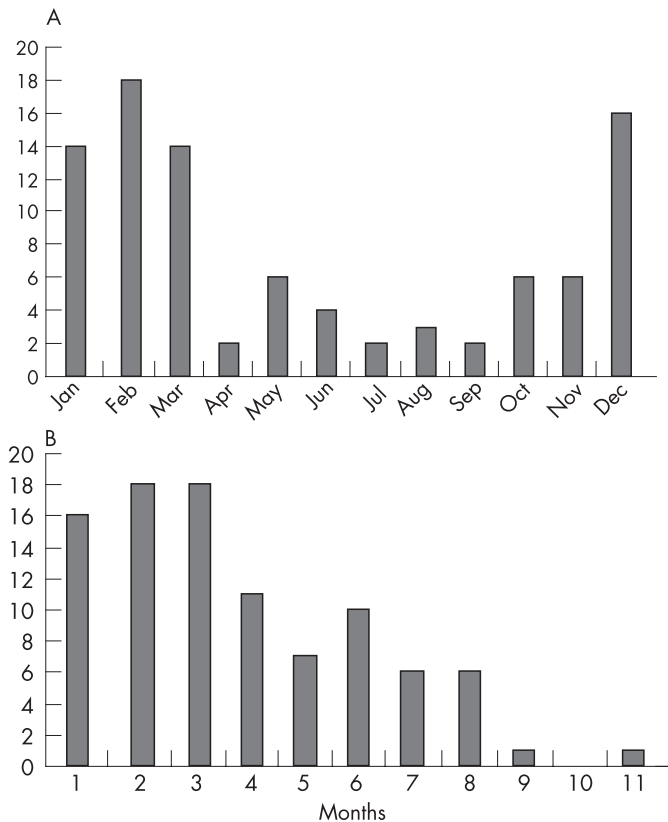


Figure 1 Unexplained infant deaths in Jerusalem, Israel (1996–2003). Number of cases identified according to month of death (A) and age in months (B).

in public health and/or paediatrics, according to ministry guidelines. Investigation typically consisted of review of the hospital record and a structured interview with a parent. Assigned ICD diagnoses were available in 62 cases. The most common diagnoses were SIDS (37%), death of unknown cause (29%), asphyxia (19%), cardiac causes (6%), infection (5%) and other (3%).

DISCUSSION

The principal finding of our study is that in Jerusalem, postmortem forensic medical investigations to determine the causes of unexplained infant deaths are almost never performed. We found no record of medical studies to determine the cause of death in 80% of cases. Only one autopsy and no site visits were performed. According to our data, none of the deaths we reviewed meets the case definition for SIDS, and they should therefore formally be classified as infant deaths of unknown cause and manner. Additionally, the finding that 28% of deaths in our series were aged 6 months or more is at odds with data from most studies of SIDS, in which 90% of cases occur before 6 months of age,² suggesting that some of the infants may have died of non-SIDS causes.

Our study was limited to the Jerusalem district. However, a 30% autopsy rate in cases of suspected SIDS was reported from the Tel Aviv district in 1992,⁸ and a more recent report indicated that no autopsies were performed in 35 cases of infant deaths which occurred in southern Israel.⁹ Thus the rate of forensic investigation of unexplained infant deaths is low in other areas of Israel as well.

The reticence to perform paediatric autopsies in Israel in general has been commented upon recently¹⁰ and attributed to the strong influence of Orthodox Judaism in society. However, it should be noted that neither Judaism nor Israel's other

Table 1 Studies performed in hospital emergency departments to determine the cause of unexplained infant death (n = 34)

	Number (%)
Bacterial cultures	
Blood	15 (44)
Stool	5 (15)
Cerebrospinal fluid	2 (6)
Urine	2 (6)
Radiographic studies	
Skeletal survey	4 (12)
Computerised tomography	1 (3)
Metabolic studies	
Urinary organic acids	1 (3)

leading religion, Islam, proscribe autopsy under any circumstances.^{11, 12} In addition, under current law, an autopsy of a child cannot be performed if parents object unless a judge is persuaded that there is a priori suspicion of a criminal cause of death.¹³ Predictably, such cases are few. In the absence of mandatory autopsy, the path of least resistance for both parents and physicians is usually to decline the procedure.

Reports from elsewhere in the world indicate that thorough investigation of unexplained infant deaths will reveal a specific cause in as many as 35% of cases.^{14–16}

Ascertaining the cause of death is of value for several reasons. First, knowing the cause of death may provide a measure of help for the grieving parents. Second, a number of conditions can mimic SIDS, including bacterial and viral infections, certain cardiac,¹⁷ metabolic¹⁸ and endocrine¹⁹ disorders, as well as unrecognised infanticide.²⁰ Since some of these have a high risk of recurrence, a specific diagnosis could potentially lead to improved genetic counselling or early institution of lifesaving treatment after future births. Finally, causes of infant mortality are reflected in vital statistics, which are an important measure of the well-being of the nation's children.

Our study illustrates that religious, political and legal factors may compromise the capacity of the health system to investigate unexplained infant deaths. Autopsy is clearly the most controversial aspect of these investigations. However, forensic applications of magnetic resonance-based and other imaging techniques are currently being developed and may soon be used to obtain much of the information provided by traditional autopsy. Out of necessity, Israel could become a laboratory to examine the utility of the "virtual autopsy"^{21, 22} for initial diagnosis of suspected SIDS.

Other diagnostic methods, including bacterial and viral cultures, toxicological, metabolic and genetic studies,^{23, 24} as well as death site examinations^{25, 26} should also be feasible even in the current environment. In general, it appears that better cooperation between physicians, law enforcement officials and religious leaders, as well as a commitment to fund their activities, may lead to improved quality of infant death investigations in Israel and in other societies in which religion plays an important role in political discourse.

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What is already known on this topic

- Sudden infant death syndrome (SIDS) is a diagnosis of exclusion, which can be made only after a full forensic investigation has been performed to rule out other causes of death.

What this study adds

- In conservative societies, legal, religious and political factors should be taken into account in order to develop acceptable but effective means for investigating unexplained infant deaths.

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