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**Date: 31 July 2019**
**Sources Searched: Embase, Medline, CINAHL, BNI, Emcare.**

# Aspiration Pneumonia and Water Birth

See full search strategy

**1. Neonatal aspiration syndrome complicating a water birth.**

**Author(s):** Sotiridou, E; Mukhopadhyay, S; Clarke, P

**Source:** Journal of obstetrics and gynaecology : the journal of the Institute of Obstetrics and Gynaecology; 2010; vol. 30 (no. 6); p. 631-633

**Publication Date:** 2010

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 20701520

**Database:** Medline

**2. Water births and the research required to assess the benefits versus the harms**

**Author(s):** Davies M.W.

**Source:** Journal of Paediatrics and Child Health; Sep 2012; vol. 48 (no. 9); p. 726-729

**Publication Date:** Sep 2012

**Publication Type(s):** Article

**PubMedID:** 20598065

Available at Journal of paediatrics and child health - from Wiley Online Library Science , Technology and Medicine Collection 2017

**Abstract:**The questions that must be asked about any health-care intervention, including the use of immersion in the second stage of labour with birth into the water, are: is it useful?, does it do any harm? and do any benefits outweigh any harms? There is little subjective evidence (and no reliable, objective evidence) of any benefit to the mother or baby from water birth. There are reports of uncommon, yet significant, adverse outcomes for babies including deaths and significant morbidity directly attributed to water birth. There are also sound physiological mechanisms that can readily explain the significant adverse outcomes reported. It remains unknown whether any benefits from water birth outweigh any harms given the small number of underpowered studies available. An appropriately sized randomised controlled trial of good quality remains the only reliable way to assess both the efficacy and the safety of water births. Babies should not be born into water unless enrolled in such trials. © 2010 Paediatrics and Child Health Division (Royal Australasian College of Physicians).

**Database:** EMBASE

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**3. Pseudomonal sepsis following water birth**

**Author(s):** Madiwale T.; Jeffries I.P.

**Source:** International Pediatrics; Sep 2006; vol. 21 (no. 3); p. 157-159

**Publication Date:** Sep 2006

**Publication Type(s):** Article

**Abstract:** Water birth is an alternative to conventional non-water birth. We report a case of a 1-day-old boy who developed sepsis and pneumonia from Pseudomonas aeruginosa following water birth. The patient presented with respiratory distress and central cyanosis 16 hours after delivery. He required assisted ventilation and nitric oxide therapy and received 2 weeks of intravenous antibiotics. There are few previous reports of neonatal Pseudomonal sepsis because Pseudomonas species is an uncommon pathogen in the neonatal period. Various adverse outcomes including aspiration, pneumonia and death have been reported following water birth. The merits of water birth have been advocated by supporters, but practitioners may not be aware of the potential risks. Copyright ©2006 Miami Children's Hospital.

**Database:** EMBASE

**4. Legionellosis following water birth in a hot tub in a Canadian neonate.**

**Author(s):** Barton, Michelle; McKelvie, Brianna; Campigotto, Aaron; Mullowney, Tara

**Source:** CMAJ: Canadian Medical Association Journal; Oct 2017; vol. 189 (no. 42)

**Publication Date:** Oct 2017

**Publication Type(s):** Academic Journal

**PubMedID:** 29061856

Available at CMAJ: Canadian Medical Association Journal - from Europe PubMed Central - Open Access

Available at CMAJ: Canadian Medical Association Journal - from ProQuest (Health Research Premium) - NHS Version

**Abstract:**The article describes a case of legionellosis following water birth in a hot tub in an eight-day-old full-term baby girl in Canada. The neonate was presented with a one-day history of fever, poor feeding and fussiness. A chest radiograph showed the patient had right upper lobe pneumonia. She had multiorgan failure, acute respiratory distress syndrome, hematologic abnormalities and hemodynamic instability while in the intensive care unit.

**Database:** CINAHL

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**5. Notes from the Field: Two Cases of Legionnaires' Disease in Newborns After Water Births - Arizona, 2016**

**Author(s):** Granseth G.; Bhattarai R.; Sylvester T.; Prasai S.; Livar E.

**Source:** MMWR. Morbidity and mortality weekly report; Jun 2017; vol. 66 (no. 22); p. 590-591

**Publication Date:** Jun 2017

**Publication Type(s):** Article

**PubMedID:** 28594785

Available at MMWR. Morbidity and mortality weekly report - from ProQuest (Health Research Premium) - NHS Version

Available at MMWR. Morbidity and mortality weekly report - from Unpaywall

**Database:** EMBASE

**6. Heated birthing pools as a source of Legionnaires' disease**

**Author(s):** Collins S.L.; Afshar B.; Walker J.T.; Aird H.; Naik F.; Parry-Ford F.; Phin N.; Harrison T.G.; Chalker V.J.; Sorrell S.; Cresswell T.

**Source:** Epidemiology and Infection; Mar 2016; vol. 144 (no. 4); p. 796-802

**Publication Date:** Mar 2016

**Publication Type(s):** Article

Available at Epidemiology and Infection - from ProQuest (Health Research Premium) - NHS Version

**Abstract:**In June 2014 Public Health England confirmed a case of Legionnaires' disease (LD) in a neonate following birth at home in a hired birthing pool incorporating a heater and a recirculation pump which had been filled in advance of labour. The case triggered a public health investigation and a microbiological survey of an additional ten heated birthing pools hired or recently hired to the general public across England. The birthing pool used by the parent of the confirmed case was identified as the source of the neonate's infection following detection of Legionella pneumophila ST48 in both patient and environmental samples. Legionella species were detected by quantitative polymerase chain reaction but not culture in a further three pools together with other opportunistic pathogens identified by culture and matrix-assisted laser desorption ionization-time of flight (MALDI-ToF) mass spectrometry. A Patient Safety Alert from NHS England and Public Health England was issued stating that heated birthing pools filled in advance of labour should not be used for home births. This recommendation remains in place. This investigation in conjunction with other recent reports has highlighted a lack of awareness regarding the microbiological safety of heated birthing pools and their potential to be a source of LD and other opportunistic infections. Furthermore, the

investigation raised important considerations with regards to microbiological sampling and testing in such incidents. Public health authorities and clinicians should consider LD in the differential diagnosis of severe respiratory infection in neonates within 14 days of a water birth.Copyright © Cambridge University Press 2015.

**Database:** EMBASE

**7. Fatal legionellosis after water birth, Texas, USA, 2014**

**Author(s):** Fritschel E.; Sanyal K.; Threadgill H.; Cervantes D.

**Source:** Emerging Infectious Diseases; 2015; vol. 21 (no. 1); p. 130-132

**Publication Date:** 2015

**Publication Type(s):** Article

**PubMedID:** 25531804

Available at Emerging Infectious Diseases - from Europe PubMed Central - Open Access

Available at Emerging Infectious Diseases - from Unpaywall

**Abstract:**In 2014, a fatal infection with Legionella pneumophila serogroup 1 occurred in a neonate after a water birth. The death highlighted the need for infection control education, client awareness, and standardization of cleaning procedures in Texas midwife facilities.Copyright © 2015, Centers for Disease Control and Prevention (CDC). All rights reserved.

**Database:** EMBASE

**8. Case of legionnaires' disease in a neonate following a home birth in a heated birthing pool, England, June 2014**

**Author(s):** Phin N.; Cresswell T.; Parry-Ford F.; Walker J.; Aird H.; Lloyd K.; Fletcher G.; Halewood A.; Stoker K.; Mason A.; Harvey-Vince L.; Harrison T.; Chalker V.; Afshar B.; Collins S.

**Source:** Eurosurveillance; Jul 2014 (no. 29)

**Publication Date:** Jul 2014

**Publication Type(s):** Article

**PubMedID:** 25080139

Available at Eurosurveillance - from Unpaywall

**Abstract:**Public Health England was notified of Legionnaires' disease in a neonate following a home birth in a heated birthing pool filled from the domestic hot water supply two weeks earlier. We describe the incident, sampling results, and public health actions. It is recommended that heated birthing pools should not be used for home births. Neonates developing pneumonia within 14 days of labour or birth in any birthing pool should be tested for Legionnaires' disease.Copyright © 2007-2013. All rights reserved.

**Database:** EMBASE

**9. Neonatal respiratory consequences from water birth in a tertiary centre**

**Author(s):** Demirel G.; Celik I.H.; Erdeve O.; Dilmen U.

**Source:** Journal of Paediatrics and Child Health; Jan 2013; vol. 49 (no. 1)

**Publication Date:** Jan 2013

**Publication Type(s):** Letter

**PubMedID:** 23320595



**Database:** EMBASE

**10. Case report: Severe disseminated adenovirus infection in a neonate following water birth delivery**

**Author(s):** Soileau S.L.; Mcadams R.M.; Schneider E.; Erdman D.D.; Lu X.; Ryan W.D.

**Source:** Journal of Medical Virology; Apr 2013; vol. 85 (no. 4); p. 667-669

**Publication Date:** Apr 2013

**Publication Type(s):** Article

**PubMedID:** 23417617



**Abstract:**Adenovirus infections are a common cause of respiratory and enteric illnesses of late infancy and childhood. In neonates, adenovirus infections are rare, carrying a high morbidity and mortality rate. We present a case of infant who developed severe pneumonia and disseminated adenoviral infection following water birth delivery to a mother with gastroenteritis. The infant's infection was due to an adenovirus strain that has not been previously reported in neonates. © 2013 Wiley Periodicals, Inc.

**Database:** EMBASE

**11. Legionella pneumophila serogroup 1 in a birthing pool**

**Author(s):** Teare L.; Millership S.

**Source:** Journal of Hospital Infection; Sep 2012; vol. 82 (no. 1); p. 58-60

**Publication Date:** Sep 2012

**Publication Type(s):** Article

**PubMedID:** 22854354

**Abstract:**This report describes a risk assessment and subsequent actions following isolation of Legionella pneumophila serogroup 1 in the water supply to a birthing pool during a planned maintenance programme. A literature search for cases of neonatal legionellosis identified 24 reports of cases among babies aged <2 months, two of which were associated with water births. On this basis, the pool was closed until Legionella spp. were undetectable. Control proved difficult as hyperchlorination failed, and a filter fitted to the thermostatic mixer tap supplying the pool slowed filling so much that additional taps were required to achieve a satisfactory flow rate. © 2012 The Healthcare Infection Society.

**Database:** EMBASE

**12. Forensic issues in cases of water birth fatalities**

**Author(s):** Byard R.W.; Zuccollo J.M.

**Source:** The American journal of forensic medicine and pathology; Sep 2010; vol. 31 (no. 3); p. 258-260

**Publication Date:** Sep 2010

**Publication Type(s):** Article

**PubMedID:** 20436337

Available at American Journal of Forensic Medicine & Pathology - from Ovid (LWW Total Access Collection 2019 - with Neurology)

**Abstract:**Birth under water has become a widely disseminated technique that is promoted to improve the quality of labor. The case of a 42-week gestation male infant is reported who died of respiratory and multiorgan failure secondary to florid pneumonia and sepsis due Pseudomonas aeruginosa following a water birth. Other infants who have been delivered underwater have drowned or have had near-drowning episodes with significant hyponatremia and water intoxication. Local and disseminated sepsis has been reported, with respiratory distress, fevers, hypoxic brain damage, and seizures. There have also been episodes of cord rupture with hemorrhage. The postmortem investigation of such cases requires a complete autopsy of the infant, with examination of the placenta. Full details of the pregnancy and delivery and inspection of the birthing unit are also needed. A septic workup of the infant and placenta should be undertaken along with sampling of water from the birthing unit and microbiological swabbing of the equipment. Vitreous sodium levels may reveal electrolyte disturbances. While fatal cases appear rare, this may change if water births gain in popularity.

**Database:** EMBASE

**13. Microbiological investigation of a nosocomial case of Legionella pneumophila pneumonia associated with water birth and review of neonatal cases**

**Author(s):** Franzin L.; Cabodi D.; Gioannini P.; Scolfaro C.

**Source:** Infezioni in Medicina; Mar 2004; vol. 12 (no. 1); p. 69-75

**Publication Date:** Mar 2004

**Publication Type(s):** Review

**PubMedID:** 15329532

**Abstract:**A case of Legionella pneumophila 1 pneumonia, confirmed by positive serology and urinary antigen, occurred in a 7-day old neonate after water birth in hospital. As respiratory samples were not available for culture, further microbiological investigations were performed on the neonate and the environment, in order to recognize the source of infection. The hospital water supply was contaminated by L. pneumophila 1 strains (300-2000 cfu/L) of two monoclonal subtypes of the Pontiac subgroup. L. spiritensis (10-225 cfu/L) was isolated from cold tap water of the patient's home. PCR from tap and humidifier water at the patient's home was positive for Legionella spp, but not for L. pneumophila. As L. pneumophila 1, responsible for child infection, was only isolated from the hospital pool water for waterbirthing, we conclude that the infant acquired the nosocomial legionellosis by prolonged delivery in contaminated water, perhaps by aspiration. Infection control measures for waterbirthing are highly recommended. A review of neonatal cases of legionellosis is also presented. As this rare infection may have a high fatality rate if unrecognized, pediatricians should be aware of the possibility of legionellosis in the newborn.

**Database:** EMBASE

**14. Neonatal sudden death due to Legionella pneumonia associated with water birth in a domestic spa bath**

**Author(s):** Nagai T.; Sobajima H.; Iwasa M.; Tsuzuki T.; Kura F.; Amemura-Maekawa J.; Watanabe H.

**Source:** Journal of Clinical Microbiology; May 2003; vol. 41 (no. 5); p. 2227-2229

**Publication Date:** May 2003

**Publication Type(s):** Article

**PubMedID:** 12734286

Available at Journal of Clinical Microbiology - from Europe PubMed Central - Open Access

Available at Journal of Clinical Microbiology - from Unpaywall

**Abstract:**We report the first case of neonatal Legionnaires' disease associated with water birth in a spa bath at home. Legionella pneumophila serogroup 6 was detected from postmortem lung tissue.

**Database:** EMBASE

**15. Legionella pneumophila pneumonia in a newborn after water birth: a new mode of transmission**

**Author(s):** Franzin L.; Scolfaro C.; Cabodi D.; Valera M.; Tovo P.A.

**Source:** Clinical infectious diseases : an official publication of the Infectious Diseases Society of America; Nov 2001; vol. 33 (no. 9)

**Publication Date:** Nov 2001

**Publication Type(s):** Article

**PubMedID:** 11568855

Available at Clinical infectious diseases : an official publication of the Infectious Diseases Society of America - from Oxford Journals - Medicine

**Abstract:**We report a case of Legionella pneumophila pneumonia in a 7-day old neonate. Because the hospital water, and particularly the pool water for water birthing, was contaminated by L. pneumophila serogroup 1, the newborn was infected following prolonged delivery in contaminated water, perhaps by aspiration. This is the first case of nosocomial Legionella pneumonia in neonate after water birth.

**Database:** EMBASE

**16. What We Learned about Waterbirth from a Case of Legionella.**

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**Author(s):** Fremgen, Laurie

**Source:** Midwifery today with international midwife; 2015 (no. 115); p. 33-34

**Publication Date:** 2015

**Publication Type(s):** Journal Article

**PubMedID:** 26591416

**Database:** Medline

**17. Case Report of Haemophilus parainfluenzae Sepsis in a Newborn Infant Following Water Birth and a Review of Literature.**

**Author(s):** Kaushik, Manu; Bober, Brittany; Eisenfeld, Leonard; Hussain, Naveed

**Source:** American Journal of Perinatology Reports; Jul 2015; vol. 5 (no. 2)

**Publication Date:** Jul 2015

**Publication Type(s):** Academic Journal

**PubMedID:** 26495182

Available at AJP reports - from Europe PubMed Central - Open Access

Available at AJP reports - from Unpaywall

**Database:** CINAHL

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## **Strategy** 693764

| # | Database | Search term | Results |
|---|---|---|---|
| 1 | Medline | exp "PNEUMONIA, ASPIRATION"/ | 5875 |
| 2 | Medline | (aspiration ADJ2 pneumonia).ti,ab | 4220 |
| 3 | Medline | ("Mendelson* Syndrome").ti,ab | 33 |
| 4 | Medline | (1 OR 2 OR 3) | 8736 |
| 5 | Medline | (waterbirth* OR "water birth*" OR "birthing pool*").ti,ab | 238 |
| 6 | Medline | (water ADJ2 birth*).ti,ab | 330 |
| 7 | Medline | exp "NATURAL CHILDBIRTH"/ | 2399 |
| 8 | Medline | (5 OR 6 OR 7) | 2739 |
| 9 | Medline | (4 AND 8) | 2 |
| 10 | EMBASE | exp "ASPIRATION PNEUMONIA"/ | 13643 |
| 11 | EMBASE | (aspiration ADJ2 pneumonia).ti,ab | 6719 |
| 12 | EMBASE | ("Mendelson* Syndrome").ti,ab | 181 |
| 13 | EMBASE | (10 OR 11 OR 12) | 15657 |
| 14 | EMBASE | (waterbirth* OR "water birth*" OR "birthing pool*").ti,ab | 305 |
| 15 | EMBASE | (water ADJ2 birth*).ti,ab | 320 |
| 16 | EMBASE | exp "WATER BIRTH"/ | 166 |

| | | | |
|---|---|---|---|
| 17 | EMBASE | (14 OR 15 OR 16) | 470 |
| 18 | EMBASE | (13 AND 17) | 1 |
| 19 | CINAHL | exp "PNEUMONIA, ASPIRATION"/ | 1372 |
| 20 | CINAHL | (aspiration ADJ2 pneumonia).ti,ab | 1094 |
| 21 | CINAHL | ("Mendelson* Syndrome").ti,ab | 15 |
| 22 | CINAHL | (19 OR 20 OR 21) | 2062 |
| 23 | CINAHL | (waterbirth* OR "water birth*" OR "birthing pool*").ti,ab | 294 |
| 24 | CINAHL | (water ADJ2 birth*).ti,ab | 198 |
| 25 | CINAHL | exp "WATER BIRTH"/ | 581 |
| 26 | CINAHL | (23 OR 24 OR 25) | 662 |
| 27 | CINAHL | (22 AND 26) | 0 |
| 28 | CINAHL | exp PNEUMONIA/ | 18481 |
| 29 | CINAHL | (26 AND 28) | 2 |
| 30 | EMBASE | exp PNEUMONIA/ | 275953 |
| 31 | EMBASE | (17 AND 30) | 18 |
| 32 | Medline | exp PNEUMONIA/ | 88243 |
| 33 | Medline | (8 AND 32) | 5 |
| 34 | EMBASE | exp WATER/ | 414250 |
| 35 | EMBASE | exp "OBSTETRIC DELIVERY"/ | 137848 |

| | | | |
|---|---|---|---|
| 36 | EMBASE | (13 AND 34 AND 35) | 8 |
| 37 | EMBASE | (30 AND 34 AND 35) | 14 |
| 38 | EMCARE | exp "ASPIRATION PNEUMONIA"/ | 4455 |
| 39 | EMCARE | (aspiration ADJ2 pneumonia).ti,ab | 1537 |
| 40 | EMCARE | ("Mendelson* Syndrome").ti,ab | 16 |
| 41 | EMCARE | (38 OR 39 OR 40) | 0 |
| 42 | EMCARE | (waterbirth* OR "water birth*" OR "birthing pool*").ti,ab | 141 |
| 43 | EMCARE | (water ADJ2 birth*).ti,ab | 116 |
| 44 | EMCARE | exp "WATER BIRTH"/ | 151 |
| 45 | EMCARE | (42 OR 43 OR 44) | 189 |
| 46 | EMCARE | (41 AND 45) | 0 |
| 47 | EMCARE | exp PNEUMONIA/ | 64513 |
| 48 | EMCARE | (45 AND 47) | 6 |
| 49 | BNI | PNEUMONIA/ | 1860 |
| 50 | BNI | (pneumonia).ti,ab | 3362 |
| 51 | BNI | (waterbirth* OR "water birth*" OR "birthing pool*").ti,ab | 340 |
| 52 | BNI | (water ADJ2 birth*).ti,ab | 190 |
| 53 | BNI | (49 OR 50) | 3973 |
| 54 | BNI | (51 OR 52) | 369 |

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|---|---|---|---|
| 55 | BNI | (53 AND 54) | 1 |
| 56 | Medline | exp "LEGIONELLA PNEUMOPHILA"/ | 3399 |
| 57 | Medline | (8 AND 56) | 7 |
| 58 | EMBASE | exp "LEGIONELLA PNEUMOPHILA"/ | 7451 |
| 59 | EMBASE | (17 AND 58) | 14 |
| 61 | CINAHL | exp LEGIONELLA/ | 653 |
| 62 | CINAHL | (26 AND 61) | 5 |
| 63 | EMCARE | exp "LEGIONELLA PNEUMOPHILA"/ | 913 |
| 64 | EMCARE | (45 AND 63) | 3 |