

OCCUPATIONAL HEALTH



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(Biohazards)



BIOLOGICAL HAZARD

Q fever

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Q fever

- ❖ **Q fever**, also called **query fever**, is
- ❖ A bacterial infection caused by the bacteria *Coxiella burnetii*.
- ❖ **Affects humans and other animals**
- ❖ It is a zoonotic
- ❖ **Most common animal reservoirs** are **cattle**, sheep, and goats
- ❖ and **other domestic mammals including cats, and dogs.**
- ❖ **Humans** typically get the **infection** as a results from
 - **Inhalation** of a **spore** in dust that **was contaminated** by infected animals
 - from **contact** with the **milk, urine faeces vaginal mucus** or **semen** of infected animals.
 - **Rarely**, the disease is **tick -borne.**
- ❖ **Humans are vulnerable to Q fever**, and infection can result **from even a few organisms**

❑ The **highest amounts** of bacteria are found in the "**birth products**" (placenta, amniotic fluid) of **infected animals**

- ❖ **Farmers,**
- ❖ **veterinarians,** and
- ❖ **people who work with these animals in labs**

are **at the highest risk** of being infected.

- ❖ The disease may cause **mild symptoms** similar to the flu.
- ❖ may clear up in a **few weeks** without any treatment
- ❖ However, **many people have no symptoms** at all.

- ❖ **In rare cases,** a more **serious form** of disease develops if the infection **is chronic,**
- ❖ means it **persists for six months** (*and there are some case reports indicating that it may persist for **more than six months***).

❖ **A more serious** form also can develop if the

❖ **infection is recurrent,**

❖ People with

heart valve problems or
weak immune systems

are **at the highest risk of** developing
these types of Q fever

The animals transmit the bacteria in:

➤ **Urine, feces, milk, fluids from giving birth**

❖ These substances can dry inside a barnyard where

➤ **contaminated dust** can float in the air.

❖ **Humans get Q fever** when they

➤ breathe in the contaminated air.

➤ In rare cases, **drinking unpasteurized milk** can cause infection.

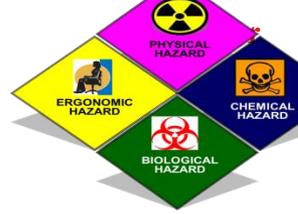
➤ **cannot be spread directly from one human to another.**

❖ The exact frequency of Q fever isn't known because most cases aren't reported.

Signs and symptoms

- ❖ **Incubation period** is usually **2-3 weeks**.
- ❖ Symptoms can vary significantly from one person to another.
- ❖ The most common manifestation is **flu-like symptoms** with **abrupt** onset of **fever, malaise, profuse perspiration, severe headache** muscle pain, loss of appetite, **upper respiratory** problems, **dry cough, confusion, chills, and gastro intestinal** symptoms such as **nausea vomiting, and diarrhoea**
- ❖ **About half of infected** individuals exhibit **no symptoms**.
- ❖ During its course, the disease **can progress to an**
- ❖ **atypical pneumonia** which can result in
- ❖ a **life-threatening acute respiratory distress syndrome**
- ❖ whereby such symptoms usually occur
- ❖ during the **first 4-5 days** of infection.





- ❑ Less often, Q fever causes **hepatitis**, which may be
 - **asymptomatic** or
 - becomes **symptomatic** with malaise, fever, liver enlargement, and pain in the right upper quadrant of the abdomen
- **transaminase** values are often elevated
- jaundice is **uncommon**.
- ❑ **Retinal vasculitis** is a rare manifestation of Q fever.
- ❑ **The chronic form** of Q fever → **endocarditis** which can
 - occur **months or decades** following the infection.
 - ❖ It is usually **fatal if untreated**.
 - ❖ However, with **appropriate treatment**,
 - ❖ the mortality falls to **around 10%**.



Who Is at Risk for Q Fever?

Since the bacteria usually infect cattle, sheep, and goats, people who are at highest risk for infection include:

- ✓ farmers
- ✓ veterinarians
- ✓ people who work around sheep
- ✓ people who work in the dairy industry
- ✓ people who work in a meat processing facilities
- ✓ people who work in research laboratories with livestock
- ✓ people who work in research laboratories with *C. burnetii*
- ✓ people who live close to a farm



Q Fever Diagnosed

It's difficult to diagnose Q fever based on symptoms alone.

suspect of Q fever

- ❖ any case of the flu-like symptoms or serious complications of Q fever and **work or live** in an
 - ❖ environment **that puts him at high risk** for exposure
- ask questions about the job or if he recently been exposed to barnyard or farm animals.

Q fever is diagnosed with a blood antibody test.

- According to the Centers for Disease Control
- antibody test **frequently appears negative**
- in **the first 7- 10** days of sickness.

➤ In a chronic infection,



Q Fever Diagnosed

- In a chronic infection.
- Serology allows the detection of chronic infection by the appearance of **high levels of the antibody**
- **chest X-ray** and
- **echocardiogram** to look heart valves.
- elevation of alanine transaminase and aspartate transaminase,
- hepatitis liver biopsy
- ❖ **Molecular detection** of bacterial **DNA** is increasingly used.
- ❖ Culture is technically difficult and
- ❖ not routinely available in most microbiology laboratories.



Complications of Q Fever?

Sometimes Q fever can **persist or come back**.

This can **lead to more serious complications** if the infection affects

Heart, liver, Lungs, brain

high risk of developing **chronic Q fever** when :

- have an existing **heart valve disease**
- have **blood vessel abnormalities**
- have a **weakened immune system**
- **Pregnant**



- ❑ According to the [CDC](#)
- ❖ **chronic Q fever** occurs in **less than 5%** of infected patients.
- ❖ The **most common and serious complication** of Q fever
- ❑ is a heart condition, **bacterial endocarditis**.
This may be **fatal if** it isn't treated.
- ❑ Other serious complications are less common.
- ❑ They include:
 - ❖ **pneumonia or other lung issues**
 - ❖ **pregnancy problems**, such as **miscarriage, stillbirth, low birth weight, premature birth,**
 - ❖ **Hepatitis,**
 - ❖ **Meningitis,**

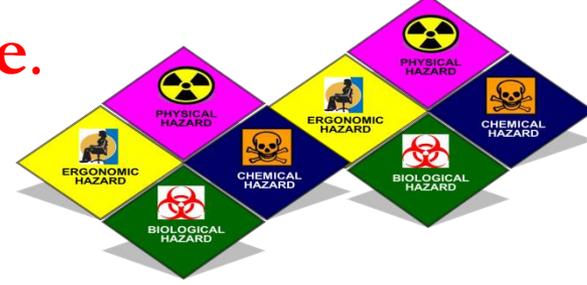


Epidemiology

- ❑ the Q fever-causing agent *C. burnetii*,
- ❑ The pathogenic agent is found everywhere
- ❑ **except New Zealand.**
- ❖ The bacterium is **extremely sustainable and virulent:**
- ❖ a **single organism** is able to **cause an infection.**
- ❖ **The common source** of infection is
- ❖ **inhalation** of contaminated dust,
- ❖ **contact with** contaminated milk, meat, or wool, and
- particularly **birthing products.**
- ❖ **Ticks** can transfer the pathogenic agent to other animals.
- ❖ No transfer between humans
- ❖ **Some studies** have shown **more men to** be affected than women,???



At risk” occupations include.



Q fever

- ✓ Veterinary personnel
- ✓ Stockyard workers
- ✓ Farmers
- ✓ Sheep shearers جزاز
- ✓ Animal transporters
- ✓ Laboratory workers handling potentially infected veterinary samples or visiting abattoirs
- ✓ Hide (leather), tannery workers

□ Q fever was first described in 1935 by [Edward Holbrook](#)

[Derrick](#) in [slaughterhouse](#) workers in [Brisbane, Queensland](#).

The "Q" stands for "query" and was applied at a time when the causative agent was unknown;



Treatment of acute Q fever

- ❖ antibiotics is very effective and should be given
- ❖ Commonly used antibiotics include doxycycline , tetracycline chloramphenicol ofloxacin Profloxacin, .
- ❑ Treatment depends on the severity of symptoms.

Mild Infection Q fever

usually resolve within a few weeks **without** any treatment

More Severe Infection

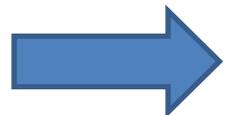
Doxycycline is the antibiotic of choice

begin taking it immediately if Q fever is suspected even before laboratory results are available.

2-3 weeks.

The symptoms, including fever, **should subside within 72 hours.**

Failure to respond to doxycycline may suggest that the illness isn't Q fever.





Chronic Infection

- Antibiotics are typically given for **18 months**
- ❖ **Chronic Q fever is more difficult to treat and**
- ❖ **can require up to four years of treatment with doxycycline.** and quinolones or doxycycline with hydroxychloroquine.
- ❖ **What Is the Outlook After Treatment?**
 - Antibiotics are usually **very effective**,
 - **endocarditis**, and fatality from the disease is very *uncommon*.
 - People with however, need an early diagnosis.

Prevention

❑ The Q fever vaccine (Q-VAX®)

- ❖ has been licensed for use in Australia since 1989
- ❖ has shown to be highly effective in preventing Q fever infection in humans.
- ❖ Protection is offered by Q-Vax,
- ❖ Since the introduction of the vaccination for high- risk occupations, the rates of Q fever infection have dropped markedly.

❑ The vaccine is made in Australia

- ❖ The vaccine is a **single injection**.
- ❖ **0.5 ml** sub-cutaneous injection given in the upper arm
- ❖ (assuming both blood and skin tests are negative
- ❖ protective immunity lasts for many years.
- ❖ Revaccination is not generally required
- ❖ **pre-vaccination ????**



Prevention Cont. ..

What is pre-vaccination screening?

- ❖ To avoid the risk of a severe reaction
- ❖ the vaccine should **only be given** to those
- ❖ who have **not been in contact** with the bacteria in the past.
- ❖ identify **pre-existing immunity**,
- because vaccinating people who **already have an immunity** can result in a **severe local reaction**

❑ **Pre-vaccination screening has 3 stages:**

- i. an interview about Q fever infection or past vaccination
- ii. blood test to check for immunity
- iii. skin test to check for immunity.

- ❖ It is possible to have been **in contact with** Q fever bacteria and **not get sick**
- ❖ so pre-vaccination screening is essential

❑ **Annual screening is typically recommended.**

- ❖ Skin reactions such as redness are common **3 to 4 days** after skin testing, however these generally
- ❖ **resolve by day 7** when the skin test is read.

- ❑ What should be considered *after* vaccination?
- ❖ Allow 15 days after vaccination before starting work in an at-risk environment.
- ❑ Keep the worker's record in a safe place as is important particularly if the worker change his jobs as the new employer will need this evidence
- ❖ In 2001, Australia introduced a national Q fever vaccination program for people working in “at risk” occupations.
- ❖ Vaccinated or previously exposed people may have their status recorded on the Australian Q Fever Register
- ❖ which may be a condition of employment in the meat processing industry

❑ The vaccine is long-lasting immunity (excess of 5 years).

❑ Possible Side Effects

- ❖ Up to 50% of those vaccinated will have local tenderness, redness and swelling at the injection site.
- ❖ In around 10% of vaccine recipient's side effects will include mild influenza-like symptoms, such as headache, fever, chills and minor sweating.
- ❖ Serious side effects are very rare

Who should be vaccinated?

- ❖ The vaccine is strongly recommended for people
- ❖ who work in high-risk occupations
- ❖ People whose work in contact with high-risk animals or
- ❖ animal products
- ❑ People can also be infected outside of work especially in
- ❑ live or visit. rural areas by breathing in infected particles and dust in the environment.

- ❑ **High risk people for Q fever** and **not vaccinated**,
- ❖ **Should take the following preventive steps:**
 - Properly **disinfect** and **decontaminate** exposed areas.
 - Properly **dispose** of all birth materials after a livestock animal has given birth.
 - **Washing** hands properly.
 - **Quarantine** infected animals.
 - **Milk pasteurization**
 - **Test animals** routinely for infection.
 - **Restrict the airflow** from barnyards and animal holding facilities to other areas.

❑ **Preliminary** results suggest **vaccination of animals** may be a method of control.

- ❖ Published trials proved that use of a registered phase **vaccine** (Coxevac) on **infected farms** is a tool of major **interest to manage or prevent**
 - ❖ early or late abortion,
 - ❖ repeat breeding,
 - ❖ decreases in milk



Q ?????