

## Chapter Six ~ Childbirth BC – Before Common Knowledge of Microbiology:

### Childbed Fever ~ an Institutional Disease of the 17<sup>th</sup>, 18<sup>th</sup>, & 19<sup>th</sup> Centuries

Hollywood and TV make it seem as if the biggest risk associated with childbirth is the moment when the baby slips out of the mother's body. In real life, only a tiny fraction of complications have anything to do with the actual birth of the baby. These facts have not, however, dissuaded the entertainment industry, which dramatically reenacts this scene again and again as the titanic struggle between life and death.

The mother-to-be is usually lying on an OR-type delivery table, her face contorted and drenched in perspiration, her legs up in obstetrical stirrups, her body covered by sterile sheets. Everyone is standing in a semicircle frantically yelling at her to push *hard*, as if she wouldn't know she was having a baby (or at least wouldn't know what to do) if it weren't for these instructions. The gowned and gloved doctor is standing between the mother's legs, sweating bullets and working very hard to do something we can't quite see between the mother's legs. With great urgency in his voice, he tells her how important it is to push *really hard*. Everyone is holding their breath and bracing themselves for a tragedy, including those in the movie theater or watching from the living room sofa.

The minutes tick by, the exhortations become more desperate, the tension mounts, the mother's efforts become weaker and more ineffectual; the screen fades to black. The next thing we see is the doctor jerking off his surgical mask. An ominous silence highlights the absence of a baby's cry; our foreboding is reinforced by a decidedly tortured look on the OB's face. Still gowned and gloved, he strides through the swinging doors of the delivery suite to the waiting room, where the innocent husband is chatting with other about-to-be or recently new fathers, who are passing around cigars and lighting up with much good cheer. To the horror of all, the unlucky doctor has to tell the dad how sorry he is, that he did all he could, he really tried, but he just couldn't save them.

That scene is enough to convince any young woman to have a scheduled Cesarean section. What is less apparent is that our emotions have been manipulated by the purposeful traumatization of normal birth for dramatic effect.

The serious complications surrounding pregnancy and childbirth are generally problems that happen either before or after the birth, either as diseases of the pregnancy or difficulties during the labor that make a normal vaginal birth impossible. For the most part, the actual birth of a baby after nine months of pregnancy is a measure of the success of the childbearing process. A normal birth at term has already eliminated the risk of infertility, miscarriage, and lethal prematurity. It means that the mother has already dodged the bullet of ill health and pregnancy complications such as toxemia, autoimmune diseases, placenta previa and other conditions that risk the life of mother and baby.

There are several uncommon but catastrophic complications of childbirth that can occur – amniotic fluid embolism, uterine rupture and hemorrhage after delivery – but all of them are rare in the natural world. Unfortunately, these serious complications are actually increased by modern

obstetrical interventions, particularly the use of the artificial hormone Pitocin to induce or speed up the labor. Pitocin makes uterine contractions artificially strong, which can force amniotic fluid into maternal blood vessels (amniotic fluid embolism), or cause the uterus to contract so hard it ruptures or flogs the uterus to contract at full force for hour after hour, until its muscular abilities become so fatigued that it is unable to continue contracting after the baby is born and a torrential postpartum hemorrhage occurs. Like the familiar traumatization of childbirth in the movies, these dramatic complications make for good newspaper copy but they are not representative of normal biology in a healthy population. When childbirth is managed physiologically (without medical interventions) these catastrophic complications are extremely rare among healthy women.

While the common complications of childbirth are less frequent and serious than the media would have us believe, there is an important exception to the rule that a normal birth means the mother is home free. This potentially fatal complication is something that happens after the birth, when it appears that the danger has past and all that's left is to call the grandparents and break out the Champaign. By sheer numbers, the biggest risk that childbearing women faced in the 700 years before antibiotics was a lethal infection called childbed fever – a blood-borne septicemia that is frequently fatal. Unlike the dramatic events portrayed on the silver screen, this was an invisible event that crept silently into the birth chamber without anyone knowing about it until it was too late. The silent killer was a virulent strain of bacteria introduced into the birth canal of a woman before, during or just after the delivery of her baby.

Most people think that childbirth is over when the baby comes out, but there is another biological event – the 3<sup>rd</sup> stage of labor, during which the placenta detaches from the uterine wall. If the mother is squatting or in any upright position, the natural influence of gravity causes the placenta to simply plop down into a basin on the floor. If she is lying down, a succession of afterbirth pains and mild pushing efforts on her part will propel the placenta out of the uterus, into the vagina where it folds over on itself and is finally squished out of the mother's vagina into a waiting basin. Birth attendants happily tell mothers not to fear this process as, unlike the baby she just pushed out, there are no bones in the placenta and its delivery doesn't hurt. Until the placenta comes out, the mother is still technically pregnant, which means the birth is not over yet.

If the mother has had an obstetrically-managed birth under general anesthesia, medical protocols frequently call for the doctor to manually remove the placenta. This is accomplished by inserting a gloved hand through the mother's vagina and up into the uterus, where the obstetrician uses his fingers to gently separate the placenta from the uterine wall. Then the intact ball of placental tissue and amniotic membranes is scooped out. When the placenta is manually removed as a part of modern medical care, the new mother is usually given an injection of the artificial hormone Pitocin to prevent excessive bleeding. This is repeated as necessary. She may also be given antibiotics prophylactically to reduce the risk of infection.

After the placenta is expelled, the place where it was attached leaves a raw surface on the inside of the uterus. This usually heals without any problem but remains theoretically vulnerable to infection for several weeks, until the normal lochia flow (bleeding after the birth) has stopped. Bacteria naturally present in the mother's genital tract, or much more frequently, carried up inside her by medical procedures (vaginal exams, breaking of the waters, the use of forceps or manual removal of the placenta after the birth, etc), can easily gain entrance to the mother's blood stream thru the open blood vessels that fed placental site in her uterus.

In a small percentage of cases, these germs are naturally present on the skin of the mother's perineum or the first few centimeters of her vagina. They can be inadvertently carried from there to the upper end of the birth canal by having sexual intercourse just prior to the onset of labor or as a result of vaginal exams during labor. However, epidemics of childbed fever are always associated with a large numbers of other childbearing women who have been institutionalized or because medical or surgical interventions accidentally introduced bacteria into the birth canal. Studies have identified the virulent strains cultured from infected women to be present in the nose and throat of two-thirds of the nurses and medical staff.

Whatever their source, these germs made their way into the uterus and infected the mother with the classic disease of puerperal sepsis, which is caused by the pathogen *hemolytic Streptococcus pyogenes*. From the mid 17<sup>th</sup> to the early 20<sup>th</sup> century, childbed fever was an endemic disease that was a consequence of aggregating a large number of childbearing women in an institutional setting, combined with the unhygienic practices of the era. *Epidemics* of puerperal sepsis (as contrasted to isolated cases) were always caused by an iatrogenic (caused by medical treatments) or nosocomial (hospital-acquired) pathogens.

### **How Childbed Fever Fits into the Development of Modern Obstetrics**

**The Centuries Before the Germ Theory of Disease:** Although childbed fever is not a new disease, it got a new name – puerperal sepsis – in the 20th century. The word ‘puerperal’ refers to the perineum of an adult female and ‘sepsis’ to the septic or putrefying nature of the infectious process. Due to the biology of childbirth, every woman who gave birth faced a tiny but real risk of infection. In the ancient world, the new mother's risk was greatly increased if the labor was unduly long or if the mother bled excessively after the birth, both of which weakened her immune system and made her more susceptible to infection. In the modern world of obstetrically-managed care, the problem was more often caused by invasive obstetrical procedures and the negative affect of general anesthesia on the mother's immune system.

In between these two extremes there was a long stretch of history that represented the worst of all possible worlds for childbearing women. Ironically, it was triggered by the best of intentions and the first attempts in the 1600s to systematically care for beggars, prostitutes and street people who had no place to go when they became ill, injured, or pregnant. Four hundred years ago hospitals were dramatically different in form and function from our modern acute-care institutions. Charity hostels run by Catholic nuns first rose during the Middle Ages in Europe to house the indigent. One of the most famous of these early hospital – Hotel Dieu -- was stated in Paris by Saint Landry in 651.

Like Mother Teresa's contemporary homes for the dying, these early hospitals were known for their hospitality (hence the name!). No medical treatment was offered or expected in these early charity hotels. Knowledge of microscopic organisms was centuries away, the concept of contagion between two or more infected patients was not understood, nor the idea that hands, instruments or equipment contaminated with purulent organic material could cause childbed fever and other deadly infections. Hand washing was unheard of, exam gloves and disposable supplies had not been invented yet, there were no health department rules to that had to be followed and no state license to be worried about losing.

It didn't take too long (1500 in the case of Hotel Dieu) for charity hospitals to become places for both treatment and teaching. Since charity hospitals provided a steady stream of 'clinical material', medical schools associated with early universities quickly recognized them as the perfect place for the clinical training of medical students. In a fairly short time hospitals became organized around medical education, the beginning of several medical traditions that survive to this day.

One of the most familiar and ancient of these rituals is "grand rounds". No Gray's Anatomy episode has ever missed the opportunity for at least one scene in which a gaggle of inept medical students and arrogant interns follow a hard-as-nails medical professor as they all troupe into the patient's room and line up in a semi-circle around the bed. Then the professor totally ignores the patient as a person while s/he uses the Socratic method to quiz each student about the patient's diagnosis, proper lab tests or proposed treatments, etc, relishing every chance to embarrass and humiliate the less than perfect answers given by the med students. The least important person in the room is the patient in the bed in the middle of all this. It's funny but a reminder that "the more things change, the more they stay the same" still applies to many aspects of modern life, including the protocols and policies of hospital politics.

In the 17<sup>th</sup>, 18<sup>th</sup> and 19<sup>th</sup> centuries, unmarried pregnant women who were without family or friends, widows, prostitutes and petty criminals found shelter in the maternity wards of these charity hospitals, living on the nuns' hospitality for a month or more before their babies were due. The social contract was simple: in exchange for bed and board and free medical care, the poorest of the poor become 'teaching cases' for the clinical instruction of medical students. For maternity patients who gave birth in these early hospitals, two thousand preceding years of rare and scattered cases of childbed fever suddenly turned into repeated epidemics that sometimes killed every woman who gave birth during an outbreak of childbed fever.

People sometimes remark that "ignorance is bliss", but for women giving birth on the wrong of microbiology and antibacterial drugs, it was anything but.

### **God's Hostel, Paris, 1626**

The first recorded epidemic of childbed fever showed up at the Hotel Dieu (God's Hospital) in Paris, an institution founded in the in 651 on *Île de la Cité* in the river Seine as a wing of Notre Dame cathedral. The *Île de la Cité* is one of two natural islands in the Seine within the city of Paris and the location where the medieval city was founded. Built directly on the riverbank, the hospital conveniently dumped its raw sewage there, while it also drew river water for drinking, bathing and cooking.

As the city's largest and poorest hospital, it treated the most vile and horrific diseases in an era devoid of about everything we would recognize as effective medical care. It was in this crowded, unhygienic institution that the world's first maternity ward was created in 1626, an attempt to segregate the sickest of the sick from the poor, but generally healthy, population of childbearing women. At the time, this was a revolutionary new idea and represented an advance in medical practice that later became the norm for every hospital. These special facilities offered one or two months free room and board for pregnant women awaiting childbirth, which is why they

were referred to as “lying-in hospitals” – the major form of care offered was a bed and regular meals. Its pregnant and newly delivered mothers slept together in huge beds that held up to six women lying head to foot with their babies by their sides.

Midwifery care for normal birth was provided by the nuns and rudimentary obstetrical care by medical students. During the next two centuries this combination of lying-in services and obstetrical care offered as part of the clinical training of medical students was replicated in the bigger cities of Europe and America. This system for clinical education is now the norm in the developed world.

While the Hotel Dieu separated pregnant women from the general population of the hospital, they did not separate sick women from those who were still healthy. At best, they simply placed the infected women on the opposite side of the room. Doctors and medical students made rounds everyday and performed vaginal exams, one after another on all the women in labor that day, with their ungloved, unwashed hands. There were no operating rooms and no anesthesia. If a maternity patient suffered from rickets, a fractured pelvis or had baby that couldn't fit through its mother's pelvis, there was no help and no hope, as neither forceps nor Cesarean section existed yet. The only way to save the mother's life was to wait until the unborn baby perished and then to remove it piece-meal through the mother's vagina with a saw and a hook.



Given this state of affairs, it's little wonder that God's Hostel would have the world's first epidemic of childbed fever twenty years later in 1646. Of course, this epidemic killer of healthy women had nothing to do with ordinary pregnancy complications or the normal biology of labor or birth. As with all infections of this kind, it was acquired from contaminated bedding, dirty instruments or the unclean hands of medical students and physicians who spread the bacteria from mothers already infected with puerperal sepsis to women in labor.

Undelivered mothers became contaminated with haemolytic strep and developed a virulent septicemia that caused death within 72 hours. A classic characteristic of this disease was an unrelenting restlessness in the infected women and inability to sleep, until the late stage of toxic shock, which caused unconsciousness just before the new mother stopped breathing. Surviving records of several English queens that died of childbed fever mention as an oddity the distress of the ladies-in-waiting, who were unable to minister to Her Majesty, as she became increasingly ill and paced yet more furiously around her chambers for hours before she finally fainted and died.

The usual remedies of the day were all tried – laxatives, bleeding, cupping and leeching, even quinine, but nothing worked. It was so horrific for the healthy women on the other side of the room to watch these restless dying women moan and writhe in their beds hour after hour that some healthy mothers became terrifically ‘upset’, a situation that the French physicians of the day classified as *hysterique*. These emotional outbursts were thought to be caused by a derangement of the uterus and to increase the risk that a pregnant woman would develop childbed fever and other ‘female’ problems. This situation gave us the words ‘hysteria’ and ‘hysterical’, as originally used to describe women who became overly emotional. It also was the origin of the word

'hysterectomy', as early medical men believed that hysteria in women was caused by wandering or deranged uteri and best treated by surgically removing the uterus, an operation that is still called a hysterectomy.

But for the victims of childbed fever at the Hotel Dieu, there was little physicians could do but ease pain with opium, watch and wait, while the sick women prayed to St. Margaret, the patron saint of childbirth. Some of the women recovered but most did not. One of the theories advanced by hospital's director was that childbed fever was being caused by miasma or 'bad air' from rotting flesh. He believed that the noxious vapors from putrefied wounds being treated on the first floor were carrying this disease to the second floor maternity ward. This theory appeared to be confirmed by the autopsies performed on the dead women. When their bodies were cut open, a terrible stench of putrefaction arose, a smell so bad that medical students sometimes fainted. Other theories of the disease included the idea that it came from placental tissues left behind in the uterus. During the postmortems on the diseased women, the intestines had what appeared to be curdled milk on its surface. As a result, some thought lactation was causing this the new disease through some kind of 'milk metastasis' – a kind of breast milk cancer that killed new mothers.

But before the Parisian doctors came to any working conclusions on its origin, the first epidemic of childbed fever at the Hotel Dieu stopped as suddenly as it had started. Unfortunately, it wasn't gone for good. A few years later, it flared and disappeared again, then developed a pattern that repeated at shorter and shorter intervals. Finally it became an annual event, the number of deaths rising in the winter months and falling in the summer. The scourge of childbed fever had become an *endemic disease of maternity wards that spanned the 295 years from 1646 until antibacterial drugs became generally available in the 1940s.*

The first epidemic in the lying-in hospital of Lyons, France, hit in 1750. Ten years later maternity wards in London suffered the same fate; Dublin hospitals were close behind in 1763. Then it spread into east into Europe and west to the United States, making epidemics of childbed fever into a worldwide problem by 1772 that killed up to one in every five new mothers who gave birth in a hospital. Almost every woman who delivered a baby at the Royal infirmary of Edinburgh in Scotland during an outbreak in 1773 caught the disease; all who became sick with childbed fever died.

In the centuries before Pasteur's germ theory became widely known, doctors couldn't exactly pinpoint what was causing their maternity patients to become septic, but they did realize it was somehow *associated with hospitalization* - aggregating childbearing women together in an institutional setting drastically increased maternal and infant mortality from childbed fever. They had observed that indigent women who gave birth on the doorsteps of the hospital, prior to admission to the maternity wards (and before any internal exams were performed), were remarkably free from this scourge, as were their newborn babies. These facts were well known to both hospital staff and townspeople. Among themselves, the obstetrical profession had to acknowledge a synergistic relationship between physicians and hospitals as a vector for virulent infections in normal childbirth, with a mortality rate several times *higher* than it was for the women they delivered at home. But they could provide no good explanation for why, nor had they any idea of what to do to prevent or to treat these epidemics.

However, the physician in charge of the maternity wards in Edinburgh in the 1770s, decided to treat childbed fever as if it were the plague. After seeing six mothers die in quick

succession, Dr. Young cleared and shut the maternity wards. He burned all the bedding and filled the wards with smoke to rid of the corrupted air. He opened the windows during the day and shot off gunpowder to dispel the miasma or bad air. When he felt that the wards had been purified, he had every surface in the rooms washed and the walls repainted and new mattresses and bed linens were ordered. When he brought back his patients, the epidemic was gone.

Dr Young's explanations were incorrect – childbed fever was not caused by foul air, which meant that exploding gunpowder was never going to eliminate it. However, his method of closing and cleaning infected wards worked better than anything else and became widely used by the mid-nineteenth century. Often this would drive the fever away for a time but after a while sources of contagion would creep back in and the infection would return. If the epidemics got too bad or too frequent, some hospital governing boards would simply have the maternity ward burned or torn down and rebuilt from scratch. Everything helped for a while but nothing lasted for very long.

Two centuries after the first outbreak at the Hotel Dieu, no one was any closer to understanding the cause of childbed fever or finding a cure. Theories abounded, with some ascribing it to a failure in public sanitation system, others to “autogenesis” -- the idea that women brought this on themselves through their inadequate hygiene or aberrant sexual practices. Others explanations were errors in the mother's diet, the shame of being an unmarried mother, or hysteria, the catchall female problem. It seemed that hysteria was the only thing doctors knew how to treat, as they regularly dosed women with laudanum to “restore rest to the body and tranquility to the mind.”

During the 18th and 19th centuries five to fifty percent of maternity patients (both mother *and* baby) died in the teaching hospitals of Europe from hemolytic septicemia. In the large institutions, this meant two or more deaths a day. According to historical records, the all-time worst epidemic of contagion occurred at the University of Jena: for four years in a row, not a single mother left the hospital alive. Another historical account describes the tolling of the bell by the monks as they walked ahead of the stretcher carrying out the body of each mother who died. The eerie effect that tolling bell had on all the maternity patients can only be imagined, as they lay on their beds waiting for it to be their turn to give birth and wondering if the bell would toll for them next.

While not every obstetrician was equally sensitive to these factors, the high morbidity and mortality of childbed sepsis also caused great psychological distress for physicians. One obstetrician of the time described his repeated experience of the “anxiety and anguish of those so lately rejoicing, the blighting of the sweetest hopes in life, and finally the rupture of its dearest ties, and the melancholy desolation of a home but lately the abode of happiness.” Around 1840 a Philadelphia physician who lost forty-five women to childbed fever in a single year broke under the strain. In hopes of protecting his patients, Dr. Rutter left the city, burned his clothes, shaved his head, beard, and mustache, pared his nails to the quick, and scrubbed himself relentlessly. Unfortunately, when he returned to practice, the next new mother he attended died from childbed fever.

Dr. Rutter extreme actions may appear to have been useless, but failure as well as success helped medical scientists understand the process of contagion. For example, it soon became obvious that not even burning down a maternity ward and building another could permanently fix the problem. This helped researchers to eventually deduce that something was being carried on the

hands of those providing care or on the materials and instruments in everyday use. Evolving ideas about the etiology of childbed septicemia convinced Oliver Wendell Holmes to begin studying the problem in the early 1840s.

Holmes was the Philadelphia physician and father of a future U. S Supreme Court justice referred to earlier. He already had a reputation as something of a prodigy, having written the popular poem “Old Ironsides” at the age of twenty-one. He continued to excel in both literature and medicine for the rest of his life. As an essayist, a theorist, a practitioner, and a wide-range thinker, he was a highly respected contributor to literary magazines. By his early thirties he was a skilled medical practitioner who also taught anatomy and physiology at Harvard.

As a doctor, he had direct knowledge about the incidence and circumstance and deadly consequence of puerperal sepsis. He carefully applied his scientific education and investigative skills to the topic and concluded after much careful research that it was a preventable disease, what we now would call iatrogenic (related to medical treatment) and nosocomial (hospital-acquired). In time, his theories were proven right. However, Holmes was not satisfied to wait for history to accord him honors for his astute diagnosis. Instead he became outraged at the needless loss of life and was doubly outraged that his medical colleagues were ignoring what were, to him, the obvious facts.

So in 1843 Holmes took the bull by the horns and did what he did best – write passionately and persuasively, and then get his work published in a prestigious journal. When he was finished, his critique was called the “Contagiousness of Puerperal Fever”. It was a series of case studies instead of the more scientific research that depended on statistically significant data for its conclusions. He didn’t have large numbers but if this truly was a design flaw, it didn’t matter -- the cumulative impact made its point anyway. Holmes presented the history of case after case that occurred in clusters linked by geography and personal contact. It became apparent (at least to him) that the disease had a logic of its own. Then he noted that the disease could be carried from victim to victim by physicians and nurses and backed up his claim with additional case studies that demonstrated the links between practitioner and infected patient. He was able to identify dying mothers who were all attended by the same physician, while other physicians and midwives in the same town delivered many babies without ever seeing the disease. To him, the empirical evidence was unmistakable.

Thomas Hager, the author of *The Demons Under the Microscope* – a contemporary book on microbiology and the discovery of antibacterial drugs -- recounts the *piece de resistance* story for iatrogenic disease. It is a grizzly tale that is beyond belief but unfortunately, also true. It seems that a physician-colleague of Dr Holmes’ had earlier in the day assisted at an autopsy and, as told by Mr. Hager, “ after assisting in the postmortem of a new mother who had died of childbed fever, carried her pelvic viscera in his pocket while attending another birth later that evening, followed by the death of the second woman a few days later, followed by the death of the woman he delivered the next morning, followed by the deaths of many of his other patients during the next few weeks.”

Not to be outdone by his own story, Dr Holmes delivered the zinger on the topic of theory versus common sense: “In the view of these facts it does appear a singular coincidence that one man or woman should have ten, twenty, thirty or seventy cases of this rare disease following his or



her footsteps with the keenness of a beagle, through the streets and lanes of a crowded city, while the scores that cross the same paths on the same errands know it only by name”.

To paraphrase none other than the literary genius of Holmes himself, he also demonstrated the “keenness of a beagle” by tracking down the necessary facts and putting together a list of commonsense precautions to lower the incidence of childbed fever. These included improved washing, especially after attending an autopsy. He recommended that physicians avoid new patients for a few weeks after attending a single case of childbed fever. He thought it prudent that an obstetrical practice completely shut down for a month if the physician was linked to two cases in a short period of time. Then he dropped the big bombshell: “*The time has come when the existence of a private pestilence in the sphere of a single physician should be looked upon not as a misfortune, but as a **crime**.*” [emphasis added]

There was the expected negative reaction from most physicians to this harsh indictment. Dr. Charles Meigs, a leading obstetrician and teacher from Philadelphia, continued to believe that childbed fever was spread according to the mysteries of God’s Providence. Like the surgeons in Lister’s day, Dr. Meigs was incensed that he or his obstetrician colleagues might be somehow be held responsible for maternal-infant mortality from childbirth septicemia. “Doctors are gentlemen,” he maintained, “and gentlemen’s hands are clean.”

While Dr. Holmes had made an impact, it was not enough to overcome the built-in denial, resistance, and vitriolic castigation of his peers. More, much more would be needed to persuade the medical establishment to change its practices. Decades later, even after the role of bacteria and contagion were more widely understood and physician-scientists around the world agreed that puerperal sepsis was spread by poor medical practices, many of these same physicians continued to insist that ‘the healing hands of a physician could never be a source of harm’ and to dismiss the iatrogenic nature of the disease as established by Lister, Semmelweis and Pasteur.