

Leslie Iffy\*

M.D. (Hon., Bpest.), F.R.C.S. (Canada). U.M.D.N.J.  
– Perinatal Center. Newark, New Jersey, USA

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**\*Corresponding author:** Leslie Iffy, M.D. (Hon.,  
Bpest.), F.R.C.S. (Canada). U.M.D.N.J. – Perinatal  
Center. Newark, New Jersey, USA, (Retired.), E-mail:  
liffy@comcast.net

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Review Article

## Hospital Acquired Obstetrical Infections

“One drop of its water reflects the whole ocean.”

The December 2, 2015 issue of the “American Medical Association Morning Rounds” reminded me to this old dictum. It announced that as a result of coordinated efforts by several national health care agencies, the rate of hospital acquired conditions diminished by 17% during the years of 2010 - 2014. With the exception of side effects of drugs, the “hospital acquired conditions” were invariably infections: “Urinary tract infection, central line associated blood stream infection, pressure ulcer and surgical site infection”. It was calculated that this endeavor saved 87,000 lives and \$ 20 billion in healthcare costs. My calculation is slightly different. In my mind this ambitious project failed to prevent almost 400,000 lives and allowed \$100 billion taxpayers’ money to be wasted. The pamphlet cites the comment of Dr. Richard Kromik, director of one of the participating organizations. It seems to reveal that deep down in their souls the investigators felt that something was missing from their announcement: “We are still trying to understand all the factors involved.”

If the best experts of the country failed to understand the causes of this disaster in the course of 5 years, I doubt they will comprehend it 5 years from now. Therefore, the quoted statement brings to my memory a remark I heard more than 50 years ago from a faculty member when I was a postgraduate student at the University of Cambridge in England:

--“Americans are still trying to discover the wheel.”

They may have never stopped trying, since recognized “experts” would know otherwise that the causes of nosocomial infections do not need to be discovered in the 2<sup>nd</sup> decade of the 21<sup>st</sup> Century. They were already explained by Oliver Wendell Holmes in the United States [1], Ignatz Semmelweis in Hungary [2], Stephane Tarnier in France [3] and Munro Kerr in Great Britain [3] in the 19<sup>th</sup> and early 20<sup>th</sup> centuries.

It is a puzzling phenomenon that although the most critical breakthrough with regard to hospital acquired infections was achieved by an obstetrician [2], the most flagrant violations of elementary principles of infection control have been and still are committed by members of his specialty. During the middle years of the last century, some observant specialists drew attention to this fact. C.M. Kunin [4], a practitioner in Illinois commented in 1972:

“Physicians behave as though Semmelweis and Oliver Wendell Holmes were shamans and the germ theory a mystical cult”.

One year later Professor Duncan Reid of Harvard University voiced similar sentiment:

“With total confidence that puerperal infection can be controlled the surgical conscience of those who care for the parturient is apt to become blunted and in some instances appears to be totally absent in respect to prevention of infection. Indeed, so flagrant are the violations that one may wonder whether the laws governing infection control no longer apply” [5].

Some enlightened members of the general public appear to possess clearer comprehension concerning the forfeited responsibility of the medical profession for this state of affairs than many physicians. Kimberly Bergalis, a young woman who contracted AIDS from her infected dentist [6], had denounced the entire medical profession for her tragic fate before she died: -“I blame all of you... You bastards!”

The reproach of Miss Bergalis was by no means misdirected. It has been understood since the days of Jenner that by breaking the skin pathogenic “germs” can predictably be introduced into the human body. Based on this knowledge Pasteur and others successfully immunized humans and animals against a vast array of infectious diseases. Yet, not until more than a decade after the outbreak of the AIDS epidemic did the American College of Obstetricians and Gynecologists (ACOG) first advise its members to refrain from using fetal scalp electrode during the labors of AIDS infected women. The 1993 edition of America’s most popular obstetrical textbook made the following statement:

-“The risks of transmission attributable to fetal scalp monitoring ... currently are uncertain” [7].

Along with one case described in the author’s textbook [8], Oleske and Iffy in 1982 quoted 3 additional well- documented literary reports of scalp electrode related catastrophic neonatal herpes simplex infection in the journal sponsored by the ACOG [9]. Why the experts of this organization thought that this experience was irrelevant to the potential transmission of the HIV virus is difficult to fathom.

Thus, not until the turn of the century did standard textbooks warn practitioners against the use of this invasive technique in AIDS patients [10]. Because fetal monitoring with scalp electrode enjoyed considerable – even if undeserved- popularity during the 1980’s and 1990’s, thousands of newborn babies shared the fate of Kimberly Bergalis on account of the inexplicable unwillingness on the part of prominent authorities to interpret facts that were obvious even for the lay public. The incidence of congenital AIDS precipitously declined after this senseless practice had been discontinued.

When I cut my finger as a toddler my young mother understood

that I could contract infection. She cleaned my wound, touched it with iodine solution soaked cotton-wool and warned me not to play with sharp objects.

Whereas the effort that saved 87,000 lives in the course of 5 years is praiseworthy, the fact remains that close to half-million patients perished and 120 billion dollars were wasted between 2010 and 2014 while the national health care agencies' program was in progress. In contrast, by rigidly implementing his "aseptic" technics, Semmelweis reduced infection related maternal mortality from 18% to 1% in his Obstetrical Unit of General Hospital in Vienna within a few months. His methods are widely known. Excellent English translation of his book is available in America for anyone whose ambitions go beyond reducing infection rates by 17% in the course of 5 years [11]. There is neither excuse nor explanation for the fact, reported recently by the Huffington Post (Dec. 2, 2015), namely that 12 percent of all patients hospitalized in America suffer from "hospital acquired conditions". There is no justification therefore for sponsoring the "Public and Private Health Care Initiative" (Washington Post, Dec. 2, 2015) with NIH or other research grants, until the directives of Holmes, Semmelweis, Tarnier and Munro Kerr have been implemented nationwide and the results objectively assessed.

I became appointed to the faculty of the University of Illinois in Chicago in the 1970's; the time when Dr. Kunin and Prof. Reid made their devastating critical comments about the lack of compliance with infection control measures in their professional environments. Although I had already noted similar attitudes in the British Islands, I was astonished by the conditions that prevailed in this supposedly reputable obstetrical center. Despite sporadic use of prophylactic antibiotics, the incidence of post-cesarean section infections exceeded 80%. This rate was 6 to 8-fold higher than those experienced in the departments of general and orthopedic surgery of the institution. Having gained assignment for the task of correcting the prevailing state of affairs, I analyzed the infection control policies of the department. I found that the prevailing circumstances differed little from those that Dr. Semmelweis had encountered when he joined the faculty of the Medical School of Vienna 125 years earlier:

The concept of isolating infected from non-infected patients, that allowed Professor Tarnier to reduce maternal mortality rates 4-fold [3], was non-existent. Women with wound infections were managed in open wards.

Nurses attended healthy and infected mothers in a haphazard manner.

Neither physicians nor nurses washed their hands regularly after attending their patients, irrespective of whether or not they were infected.

Doctors in training changed dressings of purulent wounds without wearing gloves.

Surgeons often walked into the operating room to perform major surgery immediately after they had treated infected wounds.

Resident physicians regularly moved back and forth between the OB and GYN divisions and from infected to healthy patients. Meanwhile they never changed their garments and seldom washed their hands.

On the obstetrical floor an old bathtub served the needs of every maternity patient. Mothers preparing for cesarean section took baths in it immediately after others with discharging wounds had cleaned themselves in the same. It took months before the administration of the hospital could be persuaded to remove it and install showers instead. By a broad margin, this was the crudest single violation of elementary hygiene that I have witnessed anywhere in four continents during the six decades of my professional career. I encountered it in Chicago, the city where the headquarters of the ACOG resided.

Physicians were reluctant to identify wound infections. Many of them were labeled as "sterile dehiscence". In order to overcome this problem, every postoperative wound was considered infected.

Vaginal examinations during labor were done by virtually all health care providers without hand washing, without disinfection of the vulva, often without sterile gloves and far too often unnecessarily even after premature rupture of the membranes. Many examinations remained undocumented.

Skin isolation, religiously used by surgeons in Continental Europe, was not utilized either for cesarean sections or routine gynecological surgery. This trend was corrected inside the OB division.

Resident physicians walked throughout the hospital in their operating room scrub suits. Their use was restricted, therefore to the sterile areas.

Cesarean sections on non-infected patients were regularly performed in rooms where infected cases had been operated on a few hours earlier. This routine was stopped. Such rooms were kept closed for 48 hours and were disinfected before reopening.

Transient professionals visiting from other departments were instructed to put on protective clothing before entering the labor and delivery areas.

Patients with infected wounds taken to other hospital areas for tests or investigation were required to be accompanied by a nurse with experience in infection control measures.

All mothers were considered potentially infectious postpartum. They were separated from undelivered patients.

The usual routine of maintaining lower level of infection control in the antepartum floor than in the labor and delivery areas was discontinued. It was explained that exposure to infection was equally dangerous during pregnancy and labor.

Important key to the results that derived from the above listed modifications of practice patterns was their endorsement by the remarkably open minded young faculty members who felt responsible for the previous state of affairs. However, the most decisive single factor in the success of the overall effort was the cooperation of the head nurse. She tirelessly enforced the new infection control rules. On the other hand, most of the nursing personnel took little interest in them. They feared that the new routine would increase their workload. However, they changed their attitude when it became evident that the elimination of infections relieved them from the most unpleasant aspects of their functions.

In order to enable us to evaluate the role of traditional infection control in contemporary obstetrics, the administration of prophylactic antibiotics was discontinued at the time when the implementation of the new measures began. This decision turned out to be a critically important feature of the program.

For reasons that are beyond the scope of this review, all members of the infection control team, the head nurse and the writer of this review included, left the department 18 – 30 months following the implementation of strict infection control protocol. How these developments impacted upon the rates nosocomial and post-cesarean section infections is shown in [Tables 1,2](#).

A few years after the mentioned events members of the “infection control team” coordinated their data and submitted their report for publication to “Obstetrics and Gynecology”; the journal circulated by the ACOG. Richard Mattingly, who was the editor-in-chief at that time, considered the study important enough to publish it as lead article in its December 1979 issue [12]. He indicated in his letter of acceptance that the paper could not have been considered credible and, thus acceptable for publication if the prophylactic use of antibiotics had not been abandoned at the time of the introduction of the new protocol. Discontinuation of this preventive measure demonstrated beyond reasonable doubt the superiority of “asepsis” (2) and “isolation” [3], over antibiotic prophylaxis.

According to an old Latin proverb “parva sapientia regitur mundus” (little wisdom governs the world). This proverb that I had learned in high school occurred to me when only a few years later a well-known American expert of obstetrical infections, whom I prefer not to identify at this juncture, made the following announcement in one of his publications:

**Table 1:** Nosocomial Infection Rates in the Ob & Gyn Department of the University of Illinois in the 1970's.

Study year	OB Division	GYN Division
1st	8%	2.5%
2nd	7.5%	2%
3rd	9%	7%
4th	17%	8%
5th	9%	7.5%
6th	5%	5%
7th	2.5%	3%
8th	4%	4%
9th	4%	3.5%

Along with their retiring chairman, experienced old faculty members left the Department at the end of the 2nd study year. A young new chairman was appointed who replaced the old faculty with his junior colleagues from his previous working place. The author of this review joined the Department at the beginning of the 5th study year. At that time with the enthusiastic support of young faculty members and the well-motivated head nurse, he introduced traditional infection control measures, including “asepsis” and “isolation” of infected patients.

During the 6th and 7th study years all participants of the infection control project left the Department. The faculty members who replaced them abandoned the project during the 8th and 9th study years.

Note the steep rise of nosocomial infections in the 3rd and 4th and their precipitous decline during the 5th to 7th study years. Although the program was not formally extended to the GYN Service, the trends of postoperative gynecological infection rates closely followed those of the OB Division.

The statistical data were collected by Ms. Streeter, a highly motivated nurse who worked under the authority of the Hospital Infection Committee.

**Table 2:** Infection rates following cesarean sections and vaginal deliveries at the division of obstetrics of the University of Illinois in the 1970's.

Study year	Cesarean sections	Vaginal deliveries
2nd	25%	1.5%
3rd	82%	3%
4th	78%	2%
5th	59%	2.5%
6th	28%	2%
7th	17%	2%
8th	50%	2%
9th	42%	2%

Following extensive turnover of the academic faculty at the end of the 2nd study year, post-cesarean infection rates rapidly escalated to 80%. This trend was reversed by the introduction of aseptic and isolation technics. By the 7th study year the infection rate fell to its lowest documented level (17%).

The infection control program fell apart after the team that had introduced it left the Department. Under the next management that became effective in the 8th study year, the infection rate following cesarean sections quickly rose to the 50% range. It was admitted by contemporary obstetrical textbooks, that this was the usual incidence of post-cesarean infections in US teaching institutions in and around the 1970's. At the Perinatal Center of the University of Medicine and Dentistry of New Jersey (UMDNJ) it fell to the range of 5% by the end of the last Century.

“The only effective method for preventing obstetrical infections is the use of prophylactic antibiotics.” Misinformation such as this explains why five years of coordinated effort financed by well-endowed American organizations, could not achieve even a fraction of the improvement that one young doctor unsupported even by his own institution had accomplished almost overnight one century before the discovery of antibiotics [2,11]. Even if the limited progress reported by the AMA proves lasting, close to 400,000 patients will lose their lives and 100 billion health care dollars will be wasted unnecessarily in the United States alone during the forthcoming 5 years.

Two physicians who were part of the infection control related events in Chicago continued their career a few years later at the New Jersey Medical School. Not unlike in Chicago, the rate of post-cesarean infections was at the range of 80% when they arrived. Due to the political turmoil that prevailed in Newark in the early 1970's, support by the paramedical personnel for the new infection control program that the newcomers tried to introduce was marginal at best. As a result, the elimination of nosocomial infections required more time in New Jersey than in Illinois. Nonetheless, in the course of three decades the post-cesarean infection rate decreased to the range of 5% in response to the earlier outlined preventive measures [13]. “Asepsis” and strict “isolation technics” were alone responsible for the decline from 80% to 10% – 12%. The final 5% - 7% reduction may have derived from the introduction into the protocol in the 1980's of “perioperative” administration of an antibiotic agent (usually Ampicillin) in one single injection before the initiation of the operation. However, since at about the same time (based on economic considerations) it became a nationwide policy to discharge mothers within 48 hours even following cesarean deliveries, it is not clear whether early removal of these potential sources of infection from the OB floor was not actually the main reason for the last phase of the improvement. It also deserves mention that as the number of infections decreased, their severity also gradually diminished.

Of the billions of dollars that the treatment of nosocomial

infections requires, much will end up in the bank accounts of manufacturers of antibiotics. They are busy to create new and ever more expensive antibiotic agents, if for no other reason because their abusive utilization by practitioners renders the old ones ineffective within a few years. I have never heard of traditional infection control programs having been sponsored by pharmaceutical companies. On the other hand, they generously support drug trials knowing that the publications deriving from them will promote their latest products. Services with low infection rates are of no use for evaluating the effects of new antibiotics. Obstetrical centers where infections are rampant are the ideal sites. Even if truthfully present the results, these publications obscure the fact that “asepsis” and “isolation”, (the latest of which was already used 2000 years ago) are the ideal methods of prevention. The likely reason for lack of interest in these methods is that they cost nothing. Thus, sponsoring agencies are not likely to support relevant research with generous grants.

During the same year when I first introduced traditional infection control measures in a teaching hospital in Chicago, I escaped for a short holiday to Dubrovnik; a splendid Mediterranean resort in Croatia. With the consent of Dr. Veramenta, head of its OB/GYN department, I took the opportunity of visiting the dilapidated, old City Hospital. All rooms were crowded. As many as 24 patients were in some of them. However, the cleanliness was impeccable. Of about 50 postoperative patients whom we visited during the round not a single one had febrile postoperative course. The implementation of aseptic technics was stringent. As a pleasant paradox: no patient needed to be isolated. Therefore, years later while working on the “infection control” chapter of my textbook [14], I invited Zarko Veramenta to be my co-author. I rated his expertise higher than that of those experts’, who conducted trials about the efficacy of antibiotics in services where the infection rates often reached 50%. Since his patients rarely developed wound infections, the best expert I have ever encountered was in no position of conducting trials about the use of antibiotics. Having learned my lesson, for my next textbook dealing with operative obstetrics, I invited 8 experts to outline methods of infection control in full detail [15]. One American reviewer wrote that the book was not worth buying. He had only one specific objection: The editors wasted 50 pages on an entirely insignificant issue. The insignificant issue was infection control, the lack of which will kill some 75,000 patients and cost \$ 20 billion in the USA in 2016.

The ‘surgical conscience’ of other specialists is more alert than that of most obstetricians. An example is Marty Makary, of Johns Hopkins University. He complained in his book that the surgical procedures of some of his colleagues entailed infection rates as high as 20% [16]. Against the background of 80% morbidity for obstetrical surgery, the infection rate that the author found excessive appears enviable.

A few years ago the New York Times published an extensive review of the life and work of Ignatz Semmelweis. Obviously the writer consulted physicians when he worked on this article, blissfully unaware of the fact that few American “experts” comprehend his discovery. Thus, he misinterpreted the work of Semmelweis by crediting him with the discovery of “antiseptis”; a serious misconception upon which Joseph Lister built his surgical practice in Edinburgh. Lister’s ill-fated “antiseptis” idea is the very antithesis

of the concept of “asepsis” that Semmelweis had promoted. The latter destroyed infection causing “germs” before every surgical or other intervention. In contrast, Lister tried to kill them on the operative field by spraying it with suffocating disinfectant solutions during the procedures. The idea of “antiseptis” died with its proponent. Yet, Lister (perhaps because he happened to be a favorite of Queen Victoria) is cited as “the father of modern surgery” by the Internet and in his biographies. A publication coming from the Royal Infirmary of Edinburgh, which gathered dust in the Library of the British Medical Association, quoted the opinion of Lawson Tait. He was a highly respected master surgeon and colleague of Lister during the 1860’s in the mentioned institution. This is what he said [17]:

–“Let us hear no more of the nonsense about the bad results of surgery in the pre-Listerian times as having been cured by Lister. It is not the truth ... At my hands there was no Listerism, no chemical antiseptis, nothing but soap and water and strict attention to detail.”

In the Western World in general and in North America in particular financial considerations influence both the quality and availability of health care. New discoveries achieved in economically advanced countries may give the impression that the general public invariably benefits from them. Actually, many of these innovations exponentially increase the costs of medical care and make it unavailable for a high proportion of the population. The short range financial interests of both hospitals and physicians encourage the increase of costs through the provision of unnecessary services and expensive medications for those who can afford them. This tendency translates into long waiting lists for surgical procedures and even for consultations with specialists for underprivileged members of our society.

Undoubtedly, the organization of contemporary health care is a complex task. However, none of its many aspects is more pressing than the fact that for a high proportion of patients, hospital admission carries higher risks than the disease that necessitates it. Fortunately, this issue was already addressed two centuries ago with remarkable success. That this thoroughly explored and well documented experience is ignored in the 21<sup>st</sup> Century is a grotesque phenomenon. Solution is not likely to be found until the wind is taken out of the sails of those prophets who, instead of taking meaningful action prefer to perpetuate the confusion by proposing endless investigation of questions that have been long resolved.

“The wheel does not have to be discovered!”

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