LECTURE 1

INTRODUCTION TO THE SURGERY. CONCEPTION OF SURGERY. ASEPTIC AND ANTISEPTIC.

I. Actuality of theme. The history of Ukrainian medicine and surgery is part of Ukraine's national history and culture and part of the world's medical and surgical history. It is part and parcel of socioeconomic and political processes in this country. After declaration of Ukraine's independence, local scientists obtained good opportunity to reconsider the ages-long history of our motherland. The basic goal of medical historians is to help restore the true history of our state, to remove all "white spots" from this history, to reveal all facts that were deliberately kept secret. The knowledge of the world and Ukrainian history of medicine and surgery is necessary for a doctor of any specialty, and especially for a surgeon.

You may have heard "The operation was a success, but the patient died" as the punch line of an old joke, but, sadly, it is too often true. Surgical-site infection (SSI) can be a life threatening complication following a successful operation.It was reported that 14% of all adverse events in hospitalized patients were due to SSIs. SSIs is the most common nosocomial infection among surgery patients, accounting for 38% of infections. Of these, two thirds of the infections were confined to the incision, with one third affecting organs or spaces accessed during the operation. The deaths of 77% of the patients with SSI were reportedly related to the infection. Clearly, SSIs cause substantial morbidity and mortality and create a financial burden on already stressed budgets of healthcare systems. Certain interventions can reduce SSI rates. Since the pioneering work of such surgeons as Joseph Lister, who introduced the use of carbolic acid antiseptics in 1865, and William Halstead, who advocated the use of surgical gloves in 1898, surgeons have strived to eliminate surgical infections through the use of aseptic technique. Potential sources of contamination are well defined. They include the patient and the surgical environment: the surgeon and support staff, the instruments, sutures, drapes and all other equipment which can have contact with the surgical field. The knowledge of the aseptic and antiseptic technique is necessary for all physicians.

II. Aims of lecture :
Educational:

- To study the students the main stage of hystori of world surgery and Ukrainian surgery (β=I);
- To describe the main principls of bioethics (β=I);
- To elucidate the nfluence of infectious process affects patients undergoing surgical intervention (β=II);
- To describe the principles of aseptic technique (β=II);
- To describe the principles of antiseptic technique (β=II);
- To describe appropriate operating-room attire (β=II);
- To expound correct technique for surgical scrubbing of the hands and arms(β=II);

- To charactherize the correct technique for gowning and gloving of self and others (β=II);
- To substantiate the appropriate technique for preparating the patient for surgery (β=II);
- To describe the principles of draping the patient (β=II);
- To characterize the principles of sterilization of medical instruments (β=II);
- To study the students the main principles of evidence-based medicine according the subject of lecture (β= IV).

Educative:

1. To educate for students sense of responsibility for every prescription, research, procedure, manipulation or surgery, for a health and renewal of capacity of patient, for the rightness of adequate estimation of the common state of patients and grant of timely effective treatment.
2. To form for students skills of clinical thought in the process of intercourse with the patients. To teach students to adhere to principles of medical deontology and bioethics in the process of socializing with a patient, his relatives, and also with colleagues.

III. Plan and organization of structure of lecture

№	Basic stages of lecture and their maintenance	Aims are in the levels of abstraction	Type of lecture, methods and facilities of activation of students, equipment	Division of time
1	Preliminary stage. Determination of educational aims and motivation.		Items I,II	5%

2	**Basic stage. Teaching of lecture's material** Definition of surgery and general surgery Laparoscopic, tele- and robotic surgery Hystori of world and Ukrainian surgery The main principles of bioethics Principles of Aseptic Technique Appropriate Operating-Room Attire Surgical Scrubbing of the Hands and Arms Gowning and Gloving of Self and Others Preparating the Patient Draping the Patient and Equipment Sterilization of medical instruments Principles of antiseptic technique	 I I I I II II II II II II II	Type of lecture – thematic (with controversial elements – critical analysis of results of meta-analyses, randomized controlled, trials, guidlines which are devoted for the problem of aseptic and antiseptic). Facilities of activation of students are a questions, controversial situations, illustrative material	85%
3	Final stage (resume of lecture, general conclusions, answers to the possible questions, task for students for preparation for practical classes)		List of literature, question, task for students	10%

IV. Subject of a lecture

SURGERY (from the Greek *cheirourgia* meaning "hand work") is the medical specialty that treats diseases or injuries by operative manual and instrumental treatment.

General surgery, despite its name, is a surgical specialty that focuses on surgical treatment of abdominal organs, e.g. intestines including esophagus, stomach, colon,

liver, gallbladder and bile ducts, and often the thyroid gland (depending on the availability of head and neck surgery specialists) and hernias.
In Australia, Canada, the US and the UK, general surgeons are responsible for breast care, including the surgical treatment of breast cancer. In most other countries, breast care falls under Obstetrics and Gynecology and its sub-specialty of Mastology (or Senology).

Surgical oncology is the branch of surgery which focuses on the surgical management of malignant neoplasms (cancer). Whether surgical oncology constitutes a medical specialty *per se* is the topic of a heated debate. Today, some would agree that it is simply impossible for any one surgeon to be competent in the surgical management of *all* malignant disease. However, there are currently 14 surgical oncology fellowship training programs in the United States that have been approved by the Society of Surgical Oncology. While many general surgeons are actively involved in treating patients with malignant neoplasms, the designation of "surgical oncologist" is generally reserved for those surgeons who have completed one of the approved fellowship programs. However, this is a matter of semantics, as many surgeons who are thoroughly involved in treating cancer patients may consider themselves to be surgical oncologists. Most often, *surgical oncologist* refers to a general surgical oncologist (cf. General Surgery), but thoracic surgical oncologists, gynecologic oncologists and so forth can all be considered surgeons who specialize in treating cancer patients. The importance of training surgeons who sub-specialize in cancer surgery lies in evidence, supported by a number of clinical trials, that outcomes in surgical cancer care are positively associated to surgeon volume -- i.e. the more cancer cases a surgeon treats, the more proficient he becomes, and his or her patients experience improved survival rates as a result. This is another controversial point, but it is generally accepted -- even as common sense -- that a surgeon who performs a given operation more often, will achieve superior results when compared with a surgeon who rarely performs the same procedure. This is particularly true of cancer resections such as pancreaticoduodenectomy (Whipple procedure) for pancreatic cancer, and gastrectomy with extended (D2) lymphadenectomy for gastric cancer.

In the last few years minimally invasive surgery has become more and more important. Considerable enthusiasm has built around robotic surgery (or, more accurately, robotic-assisted surgery), despite the scant data currently available failing to show real benefit. Historically, surgeons have relied primarily on their direct vision of open surgical sites to perform procedures. Open-incision surgical procedures are generally followed by long recovery periods for patients. In 1901 **Dimitri Ott**, a Petrograd gynecologist wore head mirrors to reflect light and augment visualization and used access technique in which a speculum was introduced through an incision in the prior fornix in a pregnant woman. The first experimental laparoscopy was performed in Berlin in 1901 by German surgeon **Georg Kelling**, who used a cystoscope to peer into the abdomen of a dog after first insufflating it with air. Kelling also used filtered atmospheric air to create a pneumoperitoneum, with the goal of stopping intra-abdominal bleeding (Ectopic pregnancy, bleeding ulcers, and pancreatitis) but these studies did not find any response or supporters. Kelling proposed a high-pressure insufflation of the abdominal cavity, a technique he called the "Luft-tamponade" or "air-tamponade". In 1911 **H.C. Jacobaeus**, from Stockolm, used for the first time the term "laparothorakoskopie". Using this procedure on the thorax and abdomen. He also suggested employing similar technique to examine body cavities endoscopically. Unlike Kelling he introduced the trocars directly without employing a pneumoperitoneum. Dr. **Kurst Semm,** a German gynecologist, invented the automatic insufflator in 1960, which led to the development of minimally invasive surgical techniques in the 1980s. In 1987, Dr. **Phillipe Mouret** performed the first video-laparoscopic cholecystectomy in Lyons, France. In 1994 a robotic arm was designed to hold the laparoscope camera and instruments with the goal of improving safety, reducing resource utilization and improving efficiency and versatility for the surgeon. In 1996 first live broadcast of laparoscopic surgery via the Internet. By the 1990s, minimally invasive surgery was a common occurrence. An increasing number and type of procedures are now being performed with minimally invasive techniques with better outcomes, such as enhanced patient safety, less pain, shorter recovery periods, and reduced system-wide costs. Advancements in communication, information technology, digital imaging, and robotics have also aided the development of new surgical techniques, allowing surgeons to perform procedures with greater patient comfort, safety, and accuracy.

Minimally invasive surgery. Surgeons perform a procedure by inserting surgical instruments, a light source, and an endoscopic video camera through keyhole incisions in the body near the surgical site and manipulating the instruments while viewing on the video monitors. Minimally invasive surgery procedures require an ergonomic location of video monitors and electronic equipment in the operating room as well as the ability to control lighting for optimum viewing of the monitors.

Image-guided and computer-guided surgery. Modern computer-guided surgery techniques utilize radiography, fluoroscopy, computed tomography, sonography, and magnetic resonance imaging devices as navigation systems for greater accuracy. Three-dimensional image-guided systems are being utilized for neurosurgical procedures that require precision. Portable imaging systems generally used for these procedures require parking spaces in or adjacent to the operating room.

Robotic-assisted surgery. Robotic surgery has two main components: the surgeon’s console and a robotic arm above the patient table. The surgeon sits in a console and manipulates the master controls while looking into a viewer that displays images obtained from an endoscopic camera inside the patient’s body. A slave robotic arm holds the surgical instruments inserted into the patient’s body. This master–slave manipulator allows surgeons to perform more-precise surgical procedures than those possible with conventional endoscopic surgery. Future minimally invasive gene therapy may utilize a combination of surgical robots and navigation systems.

Remote surgery (also known as **telesurgery**) is the ability for a doctor to perform surgery on a patient even though they are not physically in the same location. It is a form of telepresence. Remote surgery combines elements of robotics, cutting edge communication technology such as high-speed data connections and elements of management information systems. While the field of robotic surgery is fairly well established, most of these robots are controlled by surgeons at the location of the surgery. Remote surgery is essentially advanced telecommuting for surgeons, where the physical distance between the surgeon and the patient is immaterial. It promises to allow the expertise of specialized surgeons to be available to patients worldwide, without the need for patients to travel beyond their local hospital. One of the earliest remote surgeries was conducted on 7 September 2001 across the Atlantic Ocean, with a surgeon in New York performing a gallbladder operation on a patient 6,230 km away in Strasbourg, France. That operation, called Project Lindbergh for Charles Lindbergh's pioneering transatlantic flight from New York to Paris, was conducted over a dedicated fiberoptic link to ensure guaranteed connectivity and minimal lag.

Short hirtory of world surgery. The first surgical procedures were performed in the Neolithic Age (about 10,000 to 6000 BC). Trepanning, a procedure in which a hole is drilled in the skull to relieve pressure on the brain, may have been performed as early as 8000 BC. In Egypt, carvings dating to 2500 BC describe surgical circumcision-the removal of foreskin from the penis and the clitoris from female genitalia. Operations such as castration (the removal of a male's testicles); lithotomy (the removal of stones from the bladder); and amputation (the surgical removal of a limb or other body part) are also believed to have been performed by the Egyptians. Ancient Egyptian medical texts have been found that provide instructions for many surgical procedures including repairing a broken bone and mending a serious wound. In ancient India, the Hindus surgically treated bone fractures and removed bladder stones, tumors, and infected tonsils. They are also credited with having developed plastic surgery as early as 2000 BC in response to the punishment of cutting off a person's nose or ears for certain criminal offenses. Using skin flaps from the forehead, Hindu surgeons shaped new noses and ears for the punished criminals. In the 4th century BC, the Greek physician Hippocrates published descriptions of various surgical procedures, such as the treatment of fractures and skull injuries, with directions for the proper placement of the surgeon's hands during these operations. Herophilus, practiced medicine in Alexandria in the third century B.C., and seems to have been the first Western scientist to dissect the human body. Prior to Herophilus, no one had ever done systematic dissection of human cadavers. After him the dissection of humans was not done again for another 15 centuries in any culture in any part of the world. During most of the Middle Ages (5th century to 14th century

AD), the practice of surgery declined. It was viewed as inferior to medicine, and its practice was left to barbers who traveled from town to town cutting hair, removing tumors, pulling teeth, stitching wounds, and bloodletting, the practice of draining blood from the body, then thought to cure illness. The red-and-white striped pole that today identifies barbershops derived its design from this practice. The red stripes symbolize blood and the white stripes signify bandages.
In 1316 the French surgeon Guy de Chauliac published Chirurgia magna (Great Surgery). This massive text describes how to remove growths, repair hernias (protrusion of an organ through surrounding structures), and treat fractures using slings and weights. The text helped surgery gain respect as a serious science. At this time a new order of surgeons arose in France. They were called surgeons of the long robe, distinguished from the barber surgeons who were known as surgeons of the short robe. The barber surgeons had little medical training, while the surgeons of the long robe were studied physicians and considered such practices as bloodletting primitive. Corporations, or guilds, of surgeons of the long robe were formed in several countries.
During the 16th, 17th, and 18th centuries, many discoveries in surgical practice took place. Much credit belongs to the French surgeon Ambroise Paré, often called the father of modern surgery. Paré successfully employed the method of ligating, or tying off, arteries to control bleeding, thus eliminating the old method of cauterizing, or searing, the bleeding part with a red-hot iron or boiling oil. Discoveries about functions of the human body also helped make surgery a more accurate science during this period. For example, the English physician and anatomist William Harvey discovered the process of blood circulation and Italian anatomist Marcello Malpighi identified the existence of tiny blood vessels called capillaries that carry blood from the major blood vessels to the cells of the body. John Hunter, a British anatomist and surgeon, stressed the close relationship between medicine and surgery and performed many experimental operations that advanced the practice of surgery.
Most surgery, however, continued to be restricted to less critical areas of the body or to operations that did not penetrate the skin too deeply. Surgeons rarely opened the abdomen, chest, or skull because of the pain it caused the patient and the risk of infection. This changed in 1846 when anesthesia was used as a way to mask pain during surgery by American dentist William Morton. Although Morton is often credited with the discovery of surgical anesthesia, American surgeon Crawford W. Long used anesthesia in 1842 during the removal of tumors but did not publish his results until 1849.
Post-surgical infections remained a serious complication of surgery until the mid-19th century when the French chemist Louis Pasteur discovered that fermentation or putrefaction, the decay and death of body tissue, is caused by bacteria in the air. In 1865 the British surgeon Joseph Lister applied Pasteur's work to surgery, developing antiseptic (germ-killing) techniques including the use of a carbolic acid spray to kill germs in the operating room before surgery. These antiseptic procedures helped eliminate postoperative infection. Other physicians, including Austrian Ignaz

Semmelweiss and American Oliver Wendell Holmes, determined that bacteria are also carried on the hands and clothing and transferred from patient to patient as a physician attends one after another. These physicians pioneered techniques such as washing hands and changing into clean clothing before surgery that prevent wounds from being contaminated during surgery.
In the late 1800s, having solved the problems of pain and infection, surgeons began performing new types of surgery including procedures on the abdomen, brain, and spinal cord. At the turn of the 20th century, improved diagnostic abilities and methods of treatment helped surgery become even more effective. When the German physicist Wilhelm Conrad Roentgen invented X rays in 1895 to "photograph" the inside of the body he changed the way surgery was performed. But the first inventor of X rays was Ivan Pulyui. **Ivan Pulyui** (1845 – 1918) was a Ukranian physicist, inventor and nationalist who has been championed as an early developer of the use of X-rays for medical imaging. Pulyui, as a result of experiments into what he called cold light, is reputed to have developed an X-ray emitting device as early as 1881. Pulyui reputedly first demonstrated an X-ray photograph of a 13-year-old boy's broken arm and an X-ray photograph of his daughter's hand with a pin lying under it. The device became known as the Pulyui lamp and was mass-produced for a period. Reputedly, Pulyui personally presented one to Wilhelm Conrad Rontgen who went on to be credited as the major developer of the technology.

The discovery of the blood groups A, B, and O by Austrian pathologist Karl Landsteiner enabled surgeons to give patients transfusions of their own blood type to ensure survival during surgery. The need for a readily available supply of blood for transfusions led to the creation of blood banks in 1937.
Other technological advances permitted surgeons to perform increasingly complex and difficult operations. The introduction of antibiotics in the 1940s further minimized the risk of postoperative infection. The development of the heart-lung machine in 1953 by American surgeon John H. Gibbon allowed surgeons to more easily and successfully perform surgery on these organs. It also marked the beginning of modern clinical heart surgery. The operating microscope, developed in the 1950s, provided surgeons with a way to perform delicate operations on minute body structures like the inner ear and the eye, and more recently, enabled surgeons to reattach the tiny blood vessels from severed limbs to the body (Microsurgery). The first kidney transplants were performed in the 1950s, and the first heart transplant, in 1967, was performed by South African physician Christiaan Barnard.

History of Ukrainian surgery. Ukrainian medicine is formed in the context of the history of Ukraine. Long-term lack of Ukrainian State system, formal absence of national schools are not arguments which can serve for to object that medicine in Ukraine developed on material base, spiritual wealth and intellectual potential inherent in our land. Yes: it served and helped Ukrainians. Under historically just circumstances many things, including medicine, could be different, but as for Ukrainian medicine - it always existed, developed and it exists now.

Ukraine is the motherland of modern surgery. The earliest known surgical procedure is trepanation. A trepanned cranium found near Kyiv, Ukraine, is the oldest yet found, dating back to 7300-6220 BC.

In the first millennium BC, the Scythian civilization spread over a greater part of the present-day Ukraine. During the 1st millennium BC the steppe hinterland was occupied successively by the Cimmerians, Scythians, and Sarmatians. Characteristics of Scythian period in the history of Ukrainian medicine (mainly folk medicine) can be supplemented by the written memorials of Old Greece, relics of material cultures from the excavations of the former Greek colonies of the South of Ukraine

Kyivan Rus lasted from 900 A.D. to 1240 A.D., extending from the Baltics to the Black Sea, from the Volga to the Tisza rivers. Essentially, it was a conglomerate of principalities, with the core located in present-day Ukraine. The society of Kyivan Rus was highly sophisticated for its time, the economy flourished, and foreign relations with the rest of Europe developed extensively. In 988, the Grand Prince of Kyiv Volodymyr the Great accepted Eastern Christianity from Byzanthium on behalf of all his subjects. Most ideas concerning medicine as the subject being under the authority and trusteeship of church came with Christianity from Byzanthium. The medicine of Kyivan Rus developed as well cloister as secular medicine

The first seeds of medical knowledge were brought to Kyivan Rus from Greece with adoption of Christianity and the first distributors of medicine were monks, who came mainly from the Afon mountain. Combined with traditional practice of Eastern Slavs, the seeds gave good sprouts in cloisters that expressed in creation of specific culture of Kyivan Rus based on high spiritual and moral categories of Christian teaching.

In the process of manuscripts translation from Greek and Latin the monks added their own knowledge based on the experience of Ukranian folk medicine. "Izbornik Svytoslava" (Svyatoslav`s Collection), twice rewritten in 1073 and 1076, was one of the most popular medical books of the 11th century.

Kyiv-Pechersk cloister (the 11th cent.) played great part in the history of Ukrainian cloister medicine. It was the first in its way university of that time, the living luminary of knowledge and science not only for the educated but also for noneducated people, i.e. for the whole society — the living soul of public education The first monks of the Pechersk monastery came and brought medical knowledge from the Afon mountain. The tables of the home history include the names of such hermits that were famous for their gift of healing and curing the sick as Antoniy The Saint, Damian, Agapit Pechersky, Pimen Postnik.

Cloister medicine was the organised of the first Rus hospitals. First data about monastery hospitals belong to the 11th century. They were opened at the monasteries in Pereyaslavl-on-Dnieper, Kyiv-Pechersk Lavra, later in Novgorod, Smolensk, Lvov.

There existed also the civil, secular medicine in Kyvian Rus. Secular physicians, apparently came from Byzanthia which was the centre of medical knowledge, where independent medical collections were published in the 5th century. Most physicians, who came from Byzanthia were very popular: Feofil, Noun, Simeon Sych.

In the Kyvian Rus language surgery was called "rezaniye" that means cutting, and a surgeon was called "rezalnik" or a cutter. The surgeons of that time were skilful in operations on scull under epilepsias and other diseases. Amputation of limbs was the most distributed kind off surgical interference in the 11th century.

The next history of Ukraine is full of dramatic events. For over 100 years, the lands of Kiev Rus were under the yoke of Mongols and Tatars. Almost 300 years Left-Bank Ukraine was under the rule of Lithuania and Poland, over 200 years Right-Bank Ukraine was ruled by Turkey and Poland, for more than six centuries Western Ukraine was part of Austria, Hungary, Poland and Rumania. In 1654, after the people's struggle against Polish troops, Ukraine became an autonomy within the Moscow state.

But Ukraine had its own medicine, with Ukrainian, Byzantine and Greek roots and traditions.

The cloisters were cultural centres of Ukraine, that focused and distributed knowledge, including medical science**.** **Kirilo Biloserski** (1337 – 1442) translated into Slav language commentaries of Galen on Hippocrates (“Galenovo on Ipocrata”)
Epiphany Slavinecki (… - 1675) translated “DE HUMANI CORPORIS FABRICA LIBRI SEPTEM” A. VESALIUS
Yuriy Drohobych (Kotermak) 1450-1494, also known as Georgius de Drohobycz in Latin - Ukrainian astrologist, writer, doctor of Medicine and Philosophy of Bologna University.

After the fall of Kyivan Rus' education came from Jesuit and Orthodox schools and have remained since then the subject of political and religious conflict, because such schools were developing the national consciousness of Ukrainians. The most famous of them were the Ostroh Academy established in 1576, the Zamosc Academy (1594), and the Kyiv Mohyla Collegium (1632)

In 1576 year in Ostroh, under the patronage of Prince Vasyl Kostiantynovych Ostrozsky, the first institution of higher education in Eastern Europe was established:

the Slavic-Greek-Latin Academy ("Ostroh Athens)". It was in Ostroh in 1581 that the notable printer Ivan Fedorovych printed his most famous book, the Ostroh Bible, the first full Church Slavonic edition of the Old an NewTestaments.

ACADEMY OF ZAMOŚĆ was formed in 1594 year. The organizational and legal education at the school began with a bull from Pope Clement VIII on October 29, 1594. The papal bull permitted the establishment of a university with three secular departments: the liberal arts, law, and medicine. Because of J. Zamoyski, the Academy made contact with the medical school in Padua and directed candidates for professorships in Zamość to Padua.

In October 1632, Metropolitan Petro Mohyla of Kyiv and Galicia founded the Collegium of the Kyiv Brotherhood. Humanitarian culture flourished under Petro Mohyla, an outstanding reformer of the Eastern Orthodox Church, enlightener, and ecumenist, as it should in today's Ukrainian society. Owing to this higher school (in 1658, the Kyiv-Mohyla Collegium received the legal status of a higher educational establishment and the title of ACADEMY), the Ukrainian nation had an inexhaustible intellectual source, even through its hardest of ordeals, in the years of the national-liberation struggle, overall ruination, radical social and Weltanschauung changes in the early 18th century. Well-educated specialists for first medical schools graduated from the Academy. Most its graduates brought fame to Ukrainian medicine and surgery.

Healers, professional barbers were known even in the Zaporizhia Sitch. In 1675 the Turkey troops came upon the Sitch; during the battles "about 80 Cossacks were wounded and commander Ivan Sirko ordered the Sitch barbers to treat them. A certified physician, surgeon and barber worked in Chigirin, the capital of Bogdan Khmelnitsky. A hospital for mutilated Cossacks was organized in the Kyiv St. Cyrill church at the end of the 17th century.
The barber-surgeons formed their first official organisation in France in the year 1096, after the archbishop of Rouen prohibited the wearing of a beard. Most early physicians disdained surgery and the barbers did surgery of wounds, blood-letting, cupping and leeching, enemas and extracting teeth. In Ukraine, barbers first were chartered as a guild in 1472 in Kyiv.

In West Europe, as medicine became more defined as a field of its own, efforts were made to separate the academic surgeons from these barber-surgeons. The College deSaint Come, established in Paris in about 1210 A.D., was the first to do this by identifying the academic surgeons as surgeons of the long robe and the barber-surgeons as surgeons of the short robe. But in Ukraine surgery as academic fields of medicine was formed only in XVIII century.

Early in the 18th century the hospital school was founded in Elisavetgrad which was reformed into the medical-surgical school in 1788. Efrem Mukhin (1766-1850), the well-known physician and researcher, who came from the town of Chuguev, studied and began his activity there. Since 1795 till the end of his life he fruitfully worked in Moscow as a professor. N. Pirogov, I. Buyalsky were his pupils.

I.Buyalsky and **N. Pirogov** were the founders of surgical science in Ukraine. They created new field in anatomy - topographical anatomy.
Nikolai Ivanovich Pirogov (1810 – 1881) - great Ukrainian anatomist and surgeon. He introduced the teaching of applied topographical anatomy in Ukraine, and was one of the first to use ether in Europe. He described ether anaesthesia per rectum in 1847. Pirogov is now mainly remembered for his introduction of an osteoplastic operation for amputation of the foot, in 1854. His great atlas, published 1852 to 1859, represents the first use on a grand scale of frozen sections in anatomical illustration Professor **I. V. Buyalsky** (1789-1866), an outstanding surgeon and anatomist, Doctor of Medicine, the first home world-famed surgeon. His works Anatomo-Surgical Tables (1828) and Drawing of Taken-Out Arteries and Veins of Human Kidneys (1863) made up the glory of the home science. He became a founder of plastic anatomy which was reflected in manufacturing the anatomical preparation of the frozen body of a young man (1836), which was later casted in bronze by sculptor Peter K. Klodt. The sculpture is known as The Lying Body.Professor I. V. Buyalsky (1789-1866) first in the world used lime for sterilization of instruments and surgeon's hands
Ya. Charukovsky (1789-1848), the distinguished Ukrainian physician born in Poltava province, became famous as the military surgeon. Long before Friedrich he popularized surgical pretreatment of wounds and following suture of the wound edges in his book Military Experimental Medicine (1836).
IM.Ellinsky (1785-1834) who was the founder of academic surgery in Kharkov was its graduate and then a chief of the surgical clinic. His pupil F. Inozemtsev (1802-1869) became a well-known professor in Moscow. He made his first surgical operations under the supervision of Ellinsky. Pirogov wrote in his Letters from Sevastopol that this made Inozemtsev "far superior to me both in my opinion and in the opinion of other colleagues". Inozemtsev was the first in Russia who successfully made an operation under ether anesthesia. He was held in high respect in Moscow as the most outstanding surgeon: V. Sklifosovsky, S. Botkin, I. Sechenov, G. Zakhariin considered him their teacher.
The Medical faculty being opened in 1841 at the St. Vladimir University, the development of scientific surgery began in Kyiv. N.Pirogov, who was the administrator of the Kyiv education district at that time, stood at its cradle. A number of his pupils became professors of that faculty, **V. Karavaev (1811-1892)** being among them. He was famous all over Europe by his successful operations for cataracta. He was the first in the world to make pericardiocentesis, to describe the indications and procedure of the operation. He was also the first in Ukraine who

began using Lister's antiseptics, one of the first to use and to study narcosis for operations. His colleague V. Bets considered Karavaev one of few competent specialist in surgical anatomy in Europe.

The first anatomical theatre in Ukraine was built in 1853 in Kyiv acknowledged the best in Europe at that time. Professor **O.Valter** (1817—1889), a founder and head of the Department of Anatomy of Medical Faculty at St. Volodymyr Kyiv University was founder of it. In 1868, Professor O. Valter described Joseph Lister's work about asepsis in surgery (1865) in Ukraine medical magazine

Professor Yu. Shimanovsky worked at Kyiv University in 1861-1868. He was the first in the world surgical practice who described free skin transplantation in his monograph Operations of the Surface of Human Body (1865) which brought him the world fame. Even now this work staggers by its profoundness. Shimanovsky was the author of three-volumed manual on operative surgery awarded the prize of the Medical-Surgical Academy.The development of original plastic operations on the elbow and knee joints belongs to his. His modification of the operation of femur (knee) amputation by Gritty-Stocks enters in all the surgical manuals till now. Yu.K.Shimanovsky demonstrated a collection of proposed 22 new surgical instruments at the World exhibition of 1867 in Paris and obtained the honour reference from the international judges. He issued a unique manual of operational surgery in 3 volumes: "Manual on Operational Surgery". A monograph "Operations on the Surface of Human Body" (1865), where he had generalized the European, home and his own experience of the reconstruction surgery, is a classical work by Yu.K.Shimanovsky. He had revised and issued (at the author`s request) the famous N.I.Pirogov`s book "Surgical Anatomy of Arterial Columns and Fascias". Besides, he was a wonderful surgeon and headed surgical clinic of the Military hospital.

Introduction of ether anesthesia was the epochal event in surgery. A communication about the successful operation under the anesthesia made by American surgeon Warren on October 16, 1846, was distributed with lightning speed all over the world.

T. Vancetti made a successful operation under ether anesthesia on February 12, 1847, in Kharkov, **V. Karavaev,** on February 18, in Kyiv. V. Karavaev, as well as his teacher N. Pirogov, foresaw the great future in anesthesia; he firstly studied the effect of ether on animals, tested it on himself and then on his patients. As a result, the home surgeons, in contrast to West-European ones, almost did not fail in the method use.

In 1886 **V. Barsky** (from the clinic of the Kharkov Professor V. Grube) made a report about the experiment of the use cocaine solution injections for the local anesthesia. In the future, beginning from the early 20th century, toxical cocaine was substituted by novocaine which became the main means for the local anesthesia. **G. Sielberberg (Odessa), V. Voino-Yasenetsky** (Simferopol) made considerable contribution to the development of the methods of regional spinal anesthesia.V.F.Voino-Yasenetsky (1877—1961) was medical scientist and clergyman, surgeon and archibishop of the Crimea and Simferopol Luka, state prize laureate, professor, the author of classical work essays in suppurative surgery and theological treatise on the Spirit, Soul and Body.

A clinic of Professor N. Trinkler (1859-1917), another pupil of V. Grube, was considered one of the most progressive ones in the country.
True revolution in surgery, which provided for the aseptic treatment of the wounds was made by D. Lister (1827-1912), an English surgeon, a founder of antiseptics. **P. Pelekhin** (1842-1917) was one of the pioneers of the home antiseptics. He was the first to go to England to D. Lister to study his method. Pelekin used trichlorphenol solution instead of the toxical carbolic acid.
Late in the 80's of the 19th century the aseptic method entered in the wide surgical practice. N. Sklifasovsky, N. Trinkler, G, Rein, et al., became its pioneers in this country.
In 1900, Professor **PAVLOVSKY, FIRST CHAIRMAN of GENERAL SURGERY DEPARTMENT of MEDICAL UNIVERSITY** started sterilization of surgical instruments by boiling in 1% aqueous solution of soda

N. Sklifasovsky (1831-1904), born in the family of a poor clerk in the Kherson province, being brought-up at the orphanage, he started his activity of a surgeon in the city of Kherson; then he worked in Odessa. . The scientist was the author of development of new methods in operations for goiter, cholelithiasis, under bone fractures. He developed the methods of tongue resection, urinarybladder suture, etc. It is considered that Sklifosovsky as a surgeon and public figure was the most outstanding person after N. Pirogov.
In 1887 **N. Monastirskiy** first in the world performed cholecystojejunostomy for pancreatic cancer with jaundice. In 1887 **N. Phinippov** (Charkiv) performed operation for pancreatic cyst with excellent result. Other scientific advances permitted surgeons to perform increasingly complex and difficult operations on pancreas. The digestive enzymes, secreted by the pancreas into the intestine, were discovered in the mid to late XIX century. Among them – discovery of trypsin by **Alexander Danilevski** (Charkiv) (1862). In 1882 **Ivan Gorbachevsky,** Ukrainian scientist, Professor, Rector of Prague University was synthesized uric acid from glycin and urea, proved that uric acid can be synthesized from nucleic acids and level of uric acid increased in patients with malignant tumors, thereby introducing biochemical screening in oncology. He also discovered xanthine oxidoreductase. In 1943, **O. Paladin** (Kyiv) created and worked out the production a synthetic naphthoquinone without the isoprenoid side chain and biological activity, but can be converted to active vitamin K2, menaquinone, after alkylation in vivo - VIKASOL

Jan Mikulicz-Radecki (1850-1905) – was born in Ukraine. Although he was not the first to attempt esophagoscopy, he sparked interest in initiating gastrointestinal endoscopy. In collaboration with Josef Leiter, he developed the first esophagoscope in 1880 and the first gastroscope in 1881, and he was the first person to perform gastroscopy in the same year. He performed (independently of and simultaneously with Heinecke) the first pyloroplasty, described in 1887. The eponym "Mikulicz" is now associated with at least 18 diseases, syndromes, anatomical structures, surgical techniques, or instruments

Ludwik Rydygier (1850–1920), who was born in Ukraine, was the second surgeon in the world to resect the stomach for cancer in 1880, and he performed the first gastric resection for a benign condition (penetrating ulcer with pyloric stenosis) on 21 November 1881. He introduced the technique of resection better known as the Billroth I procedure

An outstanding part in the development of surgery in Ukraine belongs to M. Volkovich, A. Krymov, I. Ishchenko, V. Shamov, M. Kolomyichenko. Considerable contribution to the development of vascular surgery was made by E. Kramarenko, O. Tseitlin, T. Gnilorybov, Yu. Voronoy, to neurosurgery by L. Koreisha, A. Arutyunov, to orthopedics and traumatology M. Sitenko, M. Novachenko, A. Eletsky, to urology - A. Chaika, to oncology M. Bykovsky, A. Melnikov, Ya.Slonim, et al. Introduction of electronics, cybernetics, laser rays, fibre optics, progress in anesthesiology and resuscitation have determined the development of cardiac and vascular surgery, microsurgery, transplantation of organs and tissues. **Alexander O. Shalimov** (1918-2006) was great Ukrainian surgeon. Oleksandr Shalimov had performed as many as 40, 000 operations. He was the first surgeon to successfully transplant pancreas to diabetes case and elaborated new techniques of operating cases with oncology, digestion, heart and vessels diseases. Oleksandr Shalimov was a member of the Academy of Medical Sciences of Ukraine and of the Academy of Sciences of New-York. He established the Institute of Clinical and Experimental Surgery within the National Academy of Sciences, now bearing the mane of "Institute named of Shalimov" in Kyiv.

Nikolai Amosov (1913-2002) was a groundbreaking Ukrainian heart surgeon, inventor, best-selling,author, and exercise enthusiast, known for his inventions of several innovative surgical procedures for treating heart defects. He was considered the Father of biomedical and psychological cybernetics. His 1965 book Thoughts on Healthsold millions of copies

BIOETHICS AND SURGERY.

The term "bioethics" was coined in 1970 by Van Rensselaer Potter, oncologist at the University of Winsconsin, in his book "*Bioethics. A Bridge To The Future*", based on a reflection on the risks of man self-destruction due to a biothecnological delusion of omnipotence. From then on, bioethical centers have multiplied throughout the world, taking up different positions but almost everywhere pointing out new hopes for a better future, thanks to new bio-medical technologies, along with risks.

The four principles of bioethics were articulated by Tom L. Beauchamp and James R. Childress in 1994. The four principles are:

1. Respect for autonomy. This is the principle of allowing people to make decisions about themselves for themselves. It is about respecting human dignity, believing in a person's ability to make good decisions, and is the opposite of paternalism.
2. Nonmaleficence. This means that actions should not harm others. It is derived from the Hippocratic injunction to "first, do no harm."
3. Beneficence. This is the mirror image of nonmaleficence, meaning that actions are taken in order to maximize benefits to individuals and society. It is the principle of doing good.
4. Justice. This refers to distributive justice and is the principle requiring that benefits and harms should be equally distributed among people. Related ideas are fairness, equity, and impartiality.

These principles provide a useful framework for informing actions, interventions, policies, and research in public health and its related disciplines. By themselves, however, they do not usually provide clear answers to ethical dilemmas. Instead, they are used as a framework for understanding the problem at hand. For example, should physicians be required to inform patients and gain their consent to test for HIV (human immunodeficiency virus) antibody status in a hospital? On the one hand, patients who suspect that they might be HIV-positive may refuse to allow themselves to be tested, potentially aggravating an already disastrous public health problem and perhaps exposing hospital personnel to HIV. In this case, the principle of beneficence would seem to obligate the state to insist on HIV testing regardless of patient consent. On the other hand, the principle of respect for autonomy would dictate that patients have a right to make their own decisions. Thus, there is a tension between the principles of beneficence and respect for autonomy. This is not unusual in the principle-based approach.

"Quality of life" – the most important deontological problem in modern surgery. From the very beginning, an important and never exhausted point of discussion has been the concept of *quality of life*, focusing on those problems modern medicine could solve, in order to grant the highest health standards to the largest possible number of people. The first splits between the different bioethical perspectives occurred on this subject, especially between the supporters of life only when *worthy* - that is when whitin psychophysical acceptability parameters by a subjective or prevailing evaluation - and those who assert innocent human life's sacrality, inviolability and unavailability, independently of weakness, illness, or handicap circumstances. More deeply, a sharp contrast between two traditionally opposing schools of thought soon became explicit: one is the subjectivist-relativist, claiming individual autonomy as the supreme moral criterion, if necessary adapted to collectivity's needs - utilitarianism, contractualism, anarchism, behaviorism -; the other stresses the existence of changeless and universal laws in human nature, laws that must be recognized and observed in order to promote both individual and common well. Obviously, a further distinction occurs in the way such a *nature* is conceived: it can be reduced to mere psychophysical data - sociobiologism, materialism, psychologism - , or include metaphysical aspects; in this case, the fundamental reference is the concept of *person*, as the unique and unreproducible union of body and spirit, having a free and intelligent nature.

Surgeons are responsible for all activities related to patients' treatment and care in surgical units and it is therefore important for them to act in a the best and correct way towards patients, relatives, and colleagues. Studies have shown, however, that physicians often are in doubt about the best and correct actions to take for the patients in specific situations. This question is not only a medical one, but can be understood in both action and relational ethical perspectives. A relational ethical perspective means reflecting on the challenges we encounter in our relationships with others and how to best fulfil our social roles and obligations – as a person, a surgeon, and a colleague. It tries to answer questions such as "How can I adequately meet the challenges that confront me in the relationships in which I am involved in this situation?". Qualities that make a person a good physician are not only individual traits but they are characteristics of the relationships.

Surgeons' responsibility and the imperative to save life often lead to their focusing on an action ethical perspective in their reasoning. Reasoning according to this perspective means explaining our choices of actions in situations in which we are not sure what the right thing to do is. In this perspective, ethics often centers on difficult ethical dilemmas and decision-making, justifying our actions, and gives answers to the questions: What should I (we) do? Did I (we) do the right thing in this situation?. Ethical dilemmas occur when physicians have to choose between at least two alternative and equally difficult courses of actions. Because neither of the alternatives have positive outcomes, physicians have to choose between two evils. Ethical dilemmas can also be understood as conflicts between different courses of actions that result from following general and mutually exclusive ethical principles in medicine.

Action and relational ethical perspectives are not mutually exclusive, but rather complementary, as surgeons have a dual responsibility for their actions in specific situations as well as their way of being in their relationships. Being a good surgeon presupposes both professional competencies based on scientific and clinical knowledge and skills, and being present and showing respect and compassion for patients.

Surgeons today are confronted with more ethical dilemmas than before due to the growth in scientific knowledge, an increase in the availability and efficiency of medical technology, a more equal relationship between patients and surgeons, and changes in the organizational arrangement and financing of the health care system. The growth in scientific knowledge and technology has given surgeons new and better diagnostic equipment and treatment opportunities. The frequency of surgical treatment is expanding and surgeons are able to successfully operate older patients and patients with multiple and more serious diseases than before. New treatment opportunities have increased the number of possible ethical dilemmas in surgical practice and put heavy pressure on the individual surgeon who has a personal responsibility for all decisions concerning the patients' treatment and care. Ethical considerations cannot be avoided when surgeons have to choose between what ought to be done among the many courses of action that are available for patients in particular situations. Physicians and surgeons are said to experience a decrease in their autonomy at the same time because more external factors and stakeholders are influencing their decisions concerning patients' treatment .

The development of better anaesthetic methods and less invasive surgical techniques has made it possible to increase the frequency of surgery and perform rather extensive operations in out-patient facilities. The length of patients' stays in hospitals has also been reduced. The growth of new diagnostic and therapeutic opportunities in modern medicine have, in turn, created great demands on resources and made medicine a high cost endeavor. Economic factors are said to increasingly determine the patterns of clinical work, either directly or indirectly, and physicians frequently experience the ethical dilemma of allocating limited resources. It is argued that surgeons have been put under heavy political and administrative pressure to reduce costs to a greater extent than other medical specialists, and they may experience dilemmas between promoting the patients' health interests and the economic interest of the hospital and of society .

Patients today are said to expect more from medical diagnostics and treatment than before, expectations that may be greater than physicians are able to provide. They almost take for granted that everything can be treated and cured and are more willing to sue physicians for suboptimal results of treatment or deviation from perfect performance. Surgeons often experience high expectations from patients, patients' relatives, colleagues and the media, and can even feel pressure to perform innovative and undocumented surgical operations. The fear of being sued can lead to defensive medicine and reduced trust between physicians and their patients. Health care is increasingly perceived as a commodity and consumerism may lead physicians to spend more time attending to patients' wants than before, and this has made the physicians work more complicated.

ASEPTIC AND ANTISEPTIC

Proper **aseptic technique** is one of the most fundamental and essential principles of infection control in the clinical and surgical setting. The word **"aseptic"** is defined as "without microorganisms," and aseptic technique refers to specific practices which

reduce the risk of post-surgical infections in patients by decreasing the likelihood that infectious agents will invade the body during clinical procedures. These practices also are designed to help the surgical team avoid being exposed to blood, body fluids, tissue and other potentially infectious material during surgical procedures.
Several steps are crucial to ensuring proper aseptic technique:

- Ensure antiseptics are being used properly.
- Ensure that regular in-services are being held — and attended.
- Ensure that new staff undergoes orientation; this includes all job roles, including receptionists, medical staff and administrators.
- Ensure that you are acting as a proper role model to other staff members.

Antiseptic - counteracting or preventing putrefaction, or a putrescent tendency in the system; antiputrefactive. Antiseptic surgery, that system of surgical practice which insists upon a systematic use of antiseptics in the performance of operations and the dressing of wounds.

"Antisepsis relieved patients from the terrors of death and gave to the surgeon restful nights and joyous days."
William Williams Keen

History. The ancient Egyptians were the first civilization to have trained physicians to treat physical aliments. Medical papyri, such as the **Edwin Smith papyrus** (circa 1600 BC) and the **Ebers papyrus** (circa 1534 BC), provided detailed information of management of disease, including wound management with the application of various potions and grease to assist healing (Breasted, 1930; Bryan, 1930).

Hippocrates (Greek physician and surgeon, 460-377 BC), known as the father of medicine, used vinegar to irrigate open wounds and wrapped dressings around wounds to prevent further injury. His teachings remained unchallenged for centuries.

Galen (Roman gladiatorial surgeon, 130-200 AD) was first to recognize that pus from wounds inflicted by the gladiators heralded healing (*pus bonum et laudabile* ["good and commendable pus"]). Unfortunately, this observation was misinterpreted, and the concept of pus preempting wound healing persevered well into the eighteenth century. The link between pus formation and healing was emphasized so strongly that foreign material was introduced into wounds to promote pus formation-suppuration. The concept of wound healing remained a mystery, as highlighted by the famous saying by **Ambroise Paré** (French military surgeon, 1510-1590), "I dressed the wound. God healed it".

The scale of wound infections was most evident in times of war. During the American Civil War, erysipelas (necrotizing infection of soft tissue) and tetanus accounted for over 17,000 deaths. Because compound fractures at the time almost invariably were associated with infection, amputation was the only option despite a 25-90% risk of amputation stump infection. **Koch** (Professor of Hygiene and

Microbiology, Berlin, 1843-1910) first recognized the cause of infective foci as secondary to microbial growth in his nineteenth century postulates. **Semmelweis** (Austrian obstetrician, 1818-1865) demonstrated a 5-fold reduction in puerperal sepsis by hand washing between performing postmortem examinations and entering the delivery room. Semmelweis and Holmes were not the first investigators to recognise the contagious nature of puerperal fever. In *Treatise on the Epidemic of Puerperal Fever* (1795), ex-naval surgeon and Aberdonian *accoucheur* **Dr Alexander Gordon** (1752-99) warned that the disease was transmitted from one case to another by midwives and doctors.

> *"It is a disagreeable declaration for me to mention, that I myself was the means of carrying the infection to a great number of women".*

To contain the spread of infection, Gordon recommended that the infected patient's clothing and bed linen should be burned. Doctors and midwives were enjoined carefully to change clothes, wash themselves and fumigate their own clothing too. Unfortunately, Gordon was ignored. Like Holmes, Semmelweis was left to make the same painful discovery independently.

The use of disinfectants and antiseptics preceded the understanding of their action, and seems to have arisen from the observation that certain substances stopped putrefaction of meat or rotting of wood. **John Pringle** apparently first used the term "antiseptic" (Greek for "against putrefaction") in 1750 to describe substances that prevent putrefaction. The idea was eventually applied to the treatment of suppurating wounds. Mercuric chloride was used by Arabian physicians in the Middle Ages for preventing sepsis in open wounds. However, it was not until the nineteenth century that antiseptics came into general use in medicine. Chlorinated soda, essentially hypochlorite, was introduced in 1825 for the treatment of infected wounds, and the tincture of iodine was first introduced in 1839. These pioneer attempts at antisepsis were not generally accepted until Pasteur's publication in 1863 of the microbial origin of putrefaction. This led to an understanding of the origin of infection and suggested the rationale for its prevention. As so often in the history of medicine a change of practice depended on the persistence of one man. For antiseptics, this man was John Lister.

Joseph Lister (Professor of Surgery, London, 1827-1912) and **Louis Pasteur** (French bacteriologist, 1822-1895) revolutionized the entire concept of wound infection. Lister recognized that antisepsis could prevent infection. In 1867, he placed carbolic acid into open fractures to sterilize the wound and prevent sepsis and hence the need for amputation. In 1871, Lister began to use carbolic spray in the operating room to reduce contamination. However, the concept of wound suppuration persevered even among eminent surgeons, such as **John Hunter**, 1728-1793. Following the success of antiseptic surgery, aseptic surgery via heat sterilisation was inaugurated in Berlin (1886) by surgeon **Ernst von Bergmann** (1856-1907).

Hospitals and operating theatres were still hazardous places for sick and healthy alike; but the odds of survival on entry markedly improved.

Many doctors and surgeons initially regarded Lister's methods with scepticism, suspicion or even hostility. Until an understanding of the germ theory of disease, surgical infection was sometimes confused with the adverse effects of anaesthetic agents themselves. But gradually the medical profession was persuaded to adopt Lister's aseptic and antiseptic methods: their impact on patient survival-rates was too dramatic to ignore.

World War I (WWI) resulted in new types of wounds from high-velocity bullet and shrapnel injuries coupled with contamination by the mud from the trenches. **Antoine Depage** (Belgian military surgeon, 1862-1925) reintroduced wound debridement and delayed wound closure and relied on microbiological assessment of wound brushings as guidance for the timing of secondary wound closure (Helling, 1998).

Alexander Fleming (microbiologist, London, 1881-1955) performed many of his bacteriological studies during WWI and is credited with the discovery of penicillin.
As late as the nineteenth century, aseptic surgery was not routine practice. Sterilization of instruments began in the 1880s as did the wearing of gowns, masks, and gloves. **Halsted** (Professor of Surgery, Johns Hopkins University, United States, 1852-1922) introduced rubber gloves to his scrub nurse (and future wife) because she was developing skin irritation from the chemicals used to disinfect instruments. The routine use of gloves was introduces by Halsted's student J. Bloodgood. Penicillin first was used clinically in 1940 by **Howard Floery.** With the use of antibiotics, a new era in the management of wound infections commenced. Unfortunately, eradication of the infective plague affecting surgical wounds has not ended because of the insurgence of antibiotic-resistant bacterial strains and the nature of more adventurous surgical intervention in immunocompromised patients and in implant surgery.

Although great strides have been made in aseptic surgery during the 20th century, surgical procedures still carry some risk of infection. Surgery is a major source of nosocomial infections (infections contracted in the course of a hospital stay). Although surgical operations account for only about 40 percent of hospital admissions, operations are responsible for approximately 70 percent of infections acquired while in hospital). Common infectious agents like *Staphylococcus aureus* and *E. coli* can be successfully treated with antibiotics most of the time, but paradoxically, the widespread use of antibiotics in hospitals has encouraged the growth of antibiotic-resistant bacteria that are very difficult to eradicate.

Nosocomial infections are those that originate or occur in a hospital or hospital-like setting. **Nosocomial infections** are responsible for about 20,000 deaths in the U.S.

per year. Aprpoximately 10% of American hospital patients (about 2 million every year) acquire a clinically significant nosocomial infection. Nosocomial infections are the result of three factors occurring in tandem: high prevalence of pathogens, high prevalence of compromised hosts, efficient mechanisms of transmission from patient to patient. These three factors lead not just to a higher likelihood of transmission of pathogens within hospitals, but potentially to an evolution of enhanced disease - causing potential among microorganisms present within hospitals. Nosocomial infections are primarily caused by opportunists , particularly by: *Enterococcus spp. Escherichia coli Pseudomonas spp*. *Staphylococcus aureus*
The sites of nosocomial infctions, in order from most to least common, are as follows: urinary tract surgical wounds respiratory tract skin (especially burns) blood (bacteremia) gastrointestinal tract central nervous system

In 1992, the US Centers for Disease Control revised its definition of 'wound infection', creating the definition **'surgical site infection' (SSI)** to prevent confusion between the infection of a surgical incision and the infection of a traumatic wound. Most SSIs are superficial, but even so they contribute greatly to the morbidity and mortality associated with surgery .
Postoperative SSIs are still a major source of morbidity in the United States. Among the 27 million people having surgery each year, approximately 500,000 will get a nosocomial surgical site infection. Surgical site infections are the third most commonly reported nosocomial infection and are the second most commonly reported adverse event in hospitals, behind medication errors.

SSI can be classified into incisional and organ/space manipulated during an operation. Incisional infections are further divided into superficial (skin and subcutaneous tissue) and deep (deep soft tissuemuscle and fascia). Deep incisional and organ/space are the types of surgical site infections that cause the most morbidity. Infections may be caused by endogenous (e.g., bacteria on the patient's skin) or exogenous sources (e.g., personnel, the environment, materials used for surgery). Most SSIs are caused by the patient's own bacterial flora. The most common microorganisms causing SSI are Staphylococcus aureus (20 percent), Coagulase negative staphylococcus (14 percent) and Enterococcus (12 percent).

Patient characteristics that put him/her at an increased risk for a surgical site infection include diabetes, nicotine use, steroid use, obesity, malnutrition, prolonged preoperative stay, preoperative nares colonization and perioperative transfusion.
Other preoperative and intraoperative risk factors for SSI:

- Inappropriate use of antimicrobial prophylaxis
- Infection at remote site not treated prior to surgery
- Shaving the site vs. clipping
- Long duration of surgery
- Improper skin preparation

- Improper surgical team hand preparation
- Environment of the operating room (ventilation, sterilization)
- Surgical attire and drapes
- Asepsis
- Surgical technique -Hemostasis -Sterile field -Foreign bodies

Aseptic techniques are those which: remove or kill microorganisms from hands and objects; employ sterile instruments and other items; reduce patients' risk of exposure to microorganisms that cannot be removed.
The usually harmless microorganisms found on the skin of a healthcare worker (HCW) may cause infection when introduced into an area of the patient's body where they are not normally found, such as into a client's internal organs during surgery. These normal flora can also cause infection in an immuno-compromised patient who is especially susceptible to infection. Patients are also at risk of acquiring infections when bacteria from the patient's own skin infect a wound, when tissue has been damaged due to rough or excessive manipulation during surgery, or when excessive bleeding makes the tissue susceptible to invasion by microorganisms. Aseptic technique includes prepares patients for surgery, safeguards against excessive manipulation, and protects clients from microorganisms in the environment and on the HCW's skin, clothes, and hair.

Aseptic technique also encompasses practices performed immediately before and during a surgical procedure to reduce post-operative infection. These include:

- Handwashing
- Surgical scrub
- Using surgical barriers, including sterile surgical drapes and proper personal protective equipment, including head coverings, surgical masks and gowns, gloves, and shoe coverings
- Patient surgical preparation
- Maintaining a sterile field
- Using safe operative techniques
- Maintaining a safe environment in the operating room

Proper preparation of the patient using an antimicrobial product prior to surgery is essential in reducing the number of microorganisms present on the patient's skin. The skin is colonised by various types of bacteria, but up to 50% of these are *Staphylococcus aureu.* In analyses of contamination rates after cholecystectomy, the main source of wound contamination was found to be the skin of the patient. For this reason, preoperative preparation should be performed. Evidence has shown that the use of a preoperative wash containing chlorhexidine decreases the bacterial count on skin by 80-90%, resulting in a decrease in preoperative wound contamination. The

effect on SSI incidence has, however, been more difficult to demonstrate and it is possible that prolonged washing releases organisms from deeper layers of the skin.
The patient's surgical site should be thoroughly cleaned, and then an antiseptic applied to the skin. The HCW should gently scrub the skin in a circular motion, beginning in the center of the site and moving outward and using sterile sponges held by a sponge forceps. **Shaving:** It is now recognised that shaving damages the skin and that the risk of infection increases with the length of time between shaving and surgery. In one study, if the patient had been shaved more than two hours before surgery the clean wound infection rate was found to be 2.3%. However, if patients had not been shaved but their body hair had been clipped the rate was 1.7%, and if they had not been shaved or clipped the rate dropped to 0.9%. If shaving is essential, it should be performed as close to the time of surgery as possible. Clipping hair immediately before an operation also has been associated with a lower risk of SSI than shaving or clipping the night before an operation SSI rates immediately before = 1.8% vs. night before =4.0%.

The Environmental Essentials to OPERATING ROOM Cleaning

The goal of environmental control in the operating room setting is to keep microorganisms to an irreducible minimum in order to provide a safe environment for the patient and healthcare worker. Consider the infection control methods used to accomplish the goal:

- Air handling or ventilation systems of the surgical suite are designed to minimize contaminants from external air.
- Proper attire is donned to reduce the amount of contaminants carried in from outside of the operating room.
- Traffic during the operative procedure is confined to minimize the number of people in the room during the procedure and to limit access throughout.
- Perioperative cleaning and maintenance of the operating room environment.
- Contamination within an operating room is introduced from a variety of sources. The patient, healthcare workers, and inanimate objects are all capable of introducing potentially infectious material onto the surgical field.
- Operating room air may contain microbial-laden dust, lint, skin squames, or respiratory droplets. The microbial level in the operating room air is directly proportional to the number of people moving about in the room. Therefore, efforts should be made to minimize personnel traffic during operations. The greatest sources of bacterial contamination are the persons in the room at the time of surgery, including the patient. This contamination increases with movement and talking.
- To ensure patient and personnel safety, operating room cleaning procedures should be standardized and applied universally. For safe care, operating room cleaning must be considered an environmental essential.
- Consider the most obvious source: the patient. The potential for transmission of bloodborne pathogens exists in every operating room scenario because the

patient is in the operating room for an invasive procedure. Bloodborne pathogens are pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), hepatitis C virus (HCV), Delta hepatitis, and human immunodeficiency virus (HIV). Other human body fluids, including cerebrospinal, synovial, pleural, pericardial, peritoneal, amniotic, semen, vaginal secretions, and saliva (during dental procedures if mixed with blood) or combinations thereof, also have the potential to be infectious. Unfixed tissues or organs (other then intact skin) and cell or tissue cultures are also potentially infectious.

- Sources of environmental contamination can be a source of infection to both caregivers and patients and may include people, supplies, equipment, insects, packaging materials, and anything that is not specifically intrinsic to the actual patient receiving care. Any surface, living or inanimate, can serve as a vector, or carrier, of a harmful substance. Contaminants include microorganisms, chemicals, foreign particulate matter, and other materials, which can interfere with the health and safety of patient and team.
- Cleaning procedures should be carried out in a manner that protects both patients and personnel from exposure to potentially infectious microorganisms. Cleaning measures are needed before, during, and after surgical procedures and at the end of each day.
- Overall, housekeeping procedures such as wall and ceiling washing should be done on a defined, regular basis.

Before First Case of the Day

Preliminary preparation of the operating room is completed by the circulating nurse and scrub person before sorting and organizing the supplies needed for the day's caseload. Before bringing supplies into the operating room for the first case of the day, the following duties should be completed: Remove unnecessary tables and equipment from the room, arrange remaining items away from the traffic pattern. Damp dust (with a facility-approved agent) the overhead operating lights, furniture, and all flat surfaces, and damp dust the tops and rims of the sterilizer and the countertops in the substerile room. Visually inspect the room for dirt and debris. The floor may need to be damp mopped.

Room Turnover between Patients: Team Tasks

After the procedure ends and the patient has exited the room, the following personnel and areas are considered contaminated: members of the sterile team, all furniture, operating room and anesthesia equipment, the floor immediately surrounding the focus area or patient area, and patient transport carts.

Decontamination of the above should use the following process: Clean gloves must be worn during the cleanup process. For furniture, wash horizontal surfaces of all tables and equipment with a disinfectant solution (avoid using spray bottles as this will aerosolize particles). Operating table mattress pads must be washed also. Clean the casters of mobile furniture by pushing through the disinfectant solution.

For overhead lighting, the light reflectors must be washed with the manufacturer-recommended disinfectant solution. Clean all areas where gross debris is evident. All reusable anesthesia masks and tubing are to be removed, cleaned, and sterilized before reuse. All disposable masks, tubing, and circuits are placed in the trash.

After all cleaning procedures have been completed, cleaning cloths are discarded or put into a laundry bag. Close the laundry bag securely and send to the linen reprocessing area. All trash is collected in plastic or impervious bags and sealed before removal from the operating room. Floors must be cleaned a perimeter of several feet surrounding the focus point or patient area between cases. Wet vacuuming with a filter-diffuser exhaust cleaner is the method of choice for floor care in the operating room. If wet-vacuum equipment is not available, freshly laundered, clean mops can be used. The floor can be flooded with a detergent-disinfectant solution using one mop. A clean mop is used to take up the solution. Following one-time use, mop heads are removed and placed in a laundry hamper or in a plastic bag. Clean mops and disinfectant solution are used for each clean-up procedure. If walls are splashed with blood or organic debris during the surgical procedure, those areas should be washed with a detergent disinfectant.

Daily Terminal Cleaning

At the completion of the day's schedule, each operating room, whether or not it was used that day, should be terminally cleaned. The AORN "Recommended Practices for Environmental Cleaning in the Surgical Practice Setting" states, "surgical procedure rooms and scrub/utility areas should be terminally cleaned daily." This is done to reduce the number of microorganisms, dust, and organic debris present in the environment. The following routine should be used at the end of the day's schedule.

Furniture is scrubbed thoroughly, using mechanical friction. Casters and wheels are cleared of suture ends and debris and washed with a disinfectant solution. Equipment such as electrosurgical units or lasers need special care and attention when cleaning to avoid saturation of the internal machine. Ceiling and wall-mounted fixtures and tracks are cleaned on all surfaces. Kick buckets, laundry hamper frames, and trash receptacles are cleaned and disinfected. Floors are wet vacuumed thoroughly. Walls and ceilings should be checked for soil spots and cleaned as needed. Cabinets and doors should be cleaned, especially at the contact points. Air intake grills, ducts, and filter covers should be cleaned.

The obligation of the surgical team is to use safety measures in all efforts to protect the patient from harm. One of the elements inherent to this safe environment is reducing the risk of infection by using standard cleaning procedures. The duties of the OR team demand that one exercise reasonable and prudent judgment when preparing the operating room for use.

Creating and maintaining a **sterile field** is an essential component of aseptic technique. A sterile field is an area created by placing sterile surgical drapes around the patient's surgical site and on the stand that will hold sterile instruments and other items needed during surgery. When a HCW has donned proper sterile surgical attire, the HCW's sterile area is the only area that should come in contact with the sterile field. Only sterile objects and personnel may be allowed within the sterile field. When a sterile field is created around a procedure site, items below the level of the draped client are outside the field and are not sterile. Experts say that a properly gowned and gloved HCW's sterile area extends from the chest to the level of the sterile field; sleeves are sterile from 5cm above the elbow to the cuff.
It is critical for HCWs to remember that only sterile items are free of potential infectious agents, and that once a sterile object comes in contact with a non-sterile object, surface, or person, or with dust or other airborne particles, the object is no longer sterile. To maintain the sterile field, only sterile items should be placed within the sterile field.
Here are recommendations for ensuring that the sterile field remains so:

- Allow only sterile items within the sterile field.
- Do not contaminate items when they are opened, dispensed or transferred.
- Do not allow unsterile staff members within the sterile field.
- Do not allow sterile staff members within the unsterile field.
- Any sterile barrier that has been wet, cut or torn is now contaminated.
- "When in doubt, throw it out."

The integrity of sterile packages should be preserved while being opened, dispensed, or transferred. Remember that objects located below the level of the draped patient are unsterile; HCWs should not reach across unsterile areas or to touch unsterile items prior to or during the surgical procedures, and unsterile personnel should not reach across the sterile field or touch sterile items. HCWs should recognize that a sterile or high-level disinfected (HLD) barrier that has been penetrated (wet, cut, or torn) is considered to be contaminated; and finally, HCWs should be cognizant of how they move within or around the sterile field in a way that maintains sterility or HLD status.

The sterile field may also be protected by creating a safe, clean environment within the operating room. Limiting the amount of foot traffic and activities in this area may help to reduce the number of bacteria that get kicked up in the atmosphere. To maintain a safer environment, the number of HCWs entering and exiting the operating room should be limited; all personnel who enter the room should wear proper PPE; proper air handling and circulation should be established; and before the patient is brought into the operating room, all surfaces that may have been contaminated during the last procedure should be cleaned and disinfected according to hospital policies and procedures.

There are a number of related actions that support aseptic technique. The first is **handwashing.** For more than 100 years, research has shown that handwashing is the most important way to reduce the spread of infections in healthcare settings, although HCWs wash their hands only about half as often as they should. After all, hands are the most common vehicle for transmitting infections, so it is critical that HCWs understand the importance of proper handwashing practices. In brief, HCWs should wash their hands whenever there is a chance that they may have become contaminated; they should be washed before beginning a shift, immediately before and after providing patient care; before donning gloves for a clinical procedure; after touching any instrument or object that might be contaminated with blood or other body fluids; after touching mucous membranes; after handling blood, urine, or other specimens; after removing any kind of gloves; after using the restroom; and before leaving work at the end of a shift. Hands are washed to remove visible soil and invisible infectious material. They should be mechanically agitated under running water and with an antimicrobial product for approximately 15 to 30 seconds. If soap and water are not accessible, and if the hands are not visibly soiled, the HCW may use an alcohol handrub until he or she can wash his or her hands at a sink. Alcohol handrubs should be rubbed into the hands and fingernail areas and allowed to dry before resuming any activity.

Proper gloving technique also facilitates the aseptic process. Gloves provide a barrier against potentially infectious microorganisms that can be found in blood, other body fluids, and waste. HCWs should wear the proper type of gloves whenever they might come into contact with blood and other body fluids and whenever they perform a clinical procedure that might put the patient and the HCW at risk of infection. To avoid exposing one patient to potentially infectious microorganisms acquired from another patient, HCWs must use fresh gloves every time they encounter a different patient, making sure to wash their hands before and after they don gloves.

Wearing proper PPE is a third way to support aseptic technique. During surgical procedures, both patients and HCWs are especially at risk of exposure to potentially infectious microorganisms. Along with the other elements of aseptic technique, proper surgical attire helps reduce the risk of post-procedure infections by decreasing the likelihood that microorganisms will enter areas of the patient's body during procedures. Some elements of surgical attire are also designed to reduce HCWs' risk of exposure to potentially infectious blood and tissue during surgical procedures. Surgical attire includes caps, gloves, masks, gowns, protective eyewear, fluid-proof aprons, and footwear.

A fourth component of aseptic technique is surgical preparation. The warm, moist conditions inside surgical gloves provide an ideal environment for the rapid growth of microorganisms, so scrubbing with antiseptics before beginning surgical

procedures will help prevent this rapid growth of microorganisms for a period of time and will reduce the risk of infections to the patient if the gloves develop holes, tears, or nicks during surgery.
Antimicrobial agents are used in the surgical scrub because they inhibit the growth and development of microorganisms and are safe for use on the skin. A 3-to5-minute surgical scrub with an antiseptic (such as chlorhexidine or an iodophor) and running water is recommended before a surgical procedure.

MANAGEMENT OF INFECTED OR COLONIZED SURGICAL PERSONNEL – VERY IMPORTANT STEP SUPPORT ASEPTIC TECHNIQUE

Here are recommendations for management of infected or colonized surgical personnel

1.Educate and encourage surgical personnel who have signs and symptoms of a transmissible infectious illness to report conditions promptly to their supervisory and employee health service personnel.
2.Develop well-defined policies concerning patient-care responsibilities when personnel have potentially transmissible infectious conditions. These policies should govern a) personnel responsibility in using the health service and reporting illness, (b) work restrictions, and (c) clearance to resume work after an illness that required work restriction. The policies also should identify persons who have the authority to remove personnel from duty.
3. Obtain appropriate cultures from, and exclude from duty, surgical personnel who have draining skin lesions until infection has been ruled out or personnel have received adequate therapy and infection has resolved.
4. Do not routinely exclude surgical personnel who are colonized with organisms such as *S. aureus* (nose, hands, or other body site) or group A streptococcus, unless such personnel have been linked epidemiologically to dissemination of the organism in the healthcare setting.

The next of the most important interventions in preventing SSI is the optimization of antimicrobial prophylaxis. The purpose of using surgical antimicrobial prophylaxis is to provide a brief course of an antimicrobial agent in order to reduce the microbial burden of intraoperative contamination to a level that cannot overwhelm host defenses. It is not an attempt to sterilize tissues, but a critically timed adjunct to other surgical infection prevention measures.

Optimal surgical antimicrobial prophylaxis must take into consideration the following three factors:

1. Appropriate choice of antimicrobial agent
2. Proper timing of the antibimicrobial prior to the incision
3. Limiting the duration of antimicrobial administration after surgery

Appropriate Antimicrobial Agent

The choice of drug has to do with its clinical efficacy and whether it is safe, inexpensive and has a good spectrum. It should be active against the pathogens most commonly associated with wound infections following a specific procedure and against the pathogens endogenous to the region of the body being operated on.

For elective clean procedures using a foreign body and in clean contaminated procedures, it is generally recommended that a single dose of cephalosporin (e.g., cefazolin) be administered intravenously by anesthesia personnel in the operative suite just before the incision.

Proper Timing of Antimicrobial Administration

It is important to ensure that the antibiotic infusion is timed such that the optimal concentration is in the serum/tissue at the time of the incision. In addition, it is equally important to maintain that therapeutic level in the serum/tissue throughout the operation. Therefore, if the surgical procedure is longer than the half-life of the drug, the drug must be re-dosed during the procedure.

Historically, it was felt that the drug should be given during the interval between 30 minutes and two hours before the time of surgical incision. The most recent recommendations are that the drug be given no more than 30 minutes before the skin is incised.

Limiting the Duration of Antimicrobial Administration

Discontinuation of the antibiotic within 24 hours after surgery is recommended for two reasons:

1. Use of the surgical prophylaxis antimicrobial agent past this time frame has not been shown to improve surgical site infection rates and increases the cost of care unnecessarily
2. Indiscriminate use of antimicrobials can lead to the development of antibiotic-resistant microorganisms

Using safe operative techniques – one of the most important interventions in preventing SSI

<u>Aseptic surgical technique includes:</u>

1. Adhere to principles of asepsis when placing intravascular devices (e.g., central venous catheters), spinal or epidural anesthesia

catheters, or when dispensing and administering intravenous drugs.
2. Assemble sterile equipment and solutions immediately prior to use.
3. Handle tissue gently, maintain effective hemostasis, minimize devitalized tissue and foreign bodies (i.e., sutures, charred tissues, necrotic debris), and eradicate dead space at the surgical site.
4. Use delayed primary skin closure or leave an incision open to heal by second intention if the surgeon considers the surgical site to be heavily contaminated.
5. If drainage is necessary, use a closed suction drain. Place a drain through a separate incision distant from the operative incision. Remove the drain as soon as possible.

<u>Postoperative incision care includes:</u>

a. Protect with a sterile dressing for 24 to 48 hours postoperatively an incision that has been closed primarily. In the first 24-48 hours postoperatively, physician or nursing staff should not remove or disturb surgical dressings unless there is compelling evidence to do so.

b. Wash hands (hand hygiene with either waterless alcohol antiseptic product or antimicrobial soap) before and after dressing changes and any contact with the surgical site.
c. Sterile dressings should be used for surgical sites requiring dressing change. Physicians and/or nursing staff should first remove old dressings with a new pair of clean gloves, then repeat hand hygiene and don a new pair of gloves prior to handling new dressings. Clean or sterile gloves are acceptable. If using clean gloves, staff should not touch the surface of the dressing that will be in contact with the surgical site. Consider use of sterile gloves in patients who have the following risk factors: diabetes, nicotine use, steroid use, obesity, sever poor nutritional status, immunocompromised, recent radiation to area around incision.
d. Sterile saline should be used to clean the area around the surgical site. Do not use sterile saline that has been opened longer than 24 hours. Povidone-iodine (Betadine) and hydrogen peroxide are not recommended for cleaning the area around the surgical site as they are potentially cytotoxic to healing tissues.
e. Educate the patient and family regarding proper incision care, symptoms of SSI, and the need to report such symptoms.

STERILIZATION, DISINFECTION AND ANTISEPSIS: DEFINING TERMS

CLEANING - physical removal of organic matter to reduce microbial growth prior to killing the microbes. Organic material can interfere with the action of antiseptics, disinfectants, sterilants and prevent adequate penetration. Soap and water with friction is still standard. Cleaning must precede disinfection/ sterilization.

STERILIZATION - the removal or destruction of all microorganisms and their spores. All items that enter sterile tissue or vascular system must be sterile i.e. implants, scalpels, needles, surgical instruments etc

DISINFECTION - reduction in number and type of microorganisms

HIGH-LEVEL includes pasteurization or use of gluteraldehyde.. All life is destroyed except spores. Items (except dental) that touch mucous membranes should receive high-level disinfection i.e. flexible endoscopes, laryngoscopes and other similar instruments

INTERMEDIATE LEVEL HOSPITAL-grade disinfectant - an EPA approved Tuberculocidal cleaner/disinfectant. Items that touch mucous membranes or skin that is not intact should receive intermediate- level disinfection i.e. thermometers, hydrotherapy tanks

LOW-LEVEL sanitizers reduce bacteria to a "safe level". Items that touch intact skin should receive low - level disinfection i.e. stethoscopes beds, whirlpools, and equipment which are NON-INVASIVE to patients

ANTISEPSIS - inhibition of microorganism's growth on living tissue such as skin preparation before vascular line insertion or other invasive procedure. Alcohol, chlorhexidine, and Iodophors, i.e., betadine are most frequently used solution for antisepsis. Germicidal chemicals used for antisepsis are not generally adequate for decontaminating environmental surfaces

Some common antiseptics:

Iodine

So far as is known, the first use of iodine in medical practice was as a remedy for bronchocele. The first specific reference to the use of iodine in wounds was made in 1839. Iodine was officially recognized by the Pharmacopeia of the United States in 1830. In studies up to 1874, iodine was found to be one of the most efficacious antiseptics, a notion that is still valid today. Despite the successes that have been achieved with iodine, it was determined early that it also possesses properties unsuitable for practical application. It has an unpleasant odor, stains the skin with an intense yellow-brownish color, causes blue stains on laundry in the presence of starch, and combines with iron and other metals. The adverse side effects of iodine, its painfulness in open wounds, and the possibility of allergic reactions have led to the production of many great iodine compounds with the aim of avoiding these complications without much loss of germicidal efficiency. Iodophors finally succeeded as ideal forms of application.

Alcohols

Alcohols have been appreciated for centuries for their antiseptic qualities. As a chemical group, alcohols possess many features that are desirable for an antiseptic. They have a bactericidal rather than a bacteriostatic action against vegetative cells. They are relatively inexpensive, usually easily obtainable, and relatively nontoxic with topical application. Alcohols have a cleansing action, evaporate readily, and are colorless. Their destructive action against spores is much less effective than that against vegetative cells. The greatest amount of work has been done with ethanol.

Phenols

Crude mixtures of cresols solubilized by soap or alkali were originally introduced as "Lysol" and are still used as rough disinfectants. They need to be applied at high concentrations, are irritant, and toxic, but they kill bacteria, fungi, and some viruses. For more refined applications as antiseptics, chlorinated cresols or xylenols are commonly used in practice. These compounds are less active than cationic antiseptics against *Staphylcocci* and *Pseudomonas*. Hexachlorophene is a different kind of phenolic antiseptic that acts slowly, but binds strongly to the skin. It was used widely in surgical soaps and antiperspirant preparations. However, absorption through the skin can cause damage to the central nervous system, particularly in infants, and the use of hexachlorophene is now severely restricted.

Phenol no longer plays a significant role as an antibacterial agent, although its use has not been abandoned entirely. Phenols are still used today in drug formulations such as cold-sore creams and liquids, throat lozenges, and washes. Phenol derivatives are also used as preservatives and antimicrobial agents in germicidal soaps and lotions.

Quaternary Ammonium Compounds

Initially, Quaternary Ammonium Compounds were used as an adjunct to surgery, such as in preoperative patient skin treatment, degerming the hands of the surgical team preoperatively, and disinfection of surgical instruments. It was reported in 1938 that the use of alkyldimethylbenzyl ammonium chloride as a skin preparation for a patient prior to surgery reduced the incidence of wound infection.

Cationic Antiseptics

This classification covers a number of compounds differing considerably in chemical type. Their common features are the presence of strongly basic groups attached to a fairly massive lipophilic molecule. Although antiseptic action is found quite widely in compounds having these characteristics, the degree of activity is sharply dependent on structure within any particular group. One of the best and most widely used of the cationic antiseptics is chlorhexidine, which has two strongly basic groups. An important feature of its action is the strong binding of chlorhexidine to the tissues in the mouth including the teeth with subsequent slow release, which maintains an antibacterial action over an extended period.

Survival surgical procedures on all species must be conducted using aseptic technique which requires the use of sterile instruments and supplies. Many supplies such as gloves, surgical blades, and suture materials are commercially available in sterile, ready-to-use packs. However, it is frequently necessary to sterilize (in-house) items such as surgical instruments, drapes, gauze, gowns, and catheters/devices for implant.

The preferred methods of sterilization are high-pressure/temperature (e.g. autoclave) for items that can withstand high temperature. For items which are unable to withstand high temperatures and pressure, ethylene oxide gas is the preferred method of sterilization. However, cold chemical sterilization may be used effectively for many items.

The following are approved sterilization procedures:
1. High-pressure/temperature steam sterilization using an autoclave and appropriate monitoring systems to assure sterility.
2. Dry Heat (e.g. hot glass bead sterilizer). These units only sterilize the tip of instruments. Caution: instruments must be cooled before contacting tissue.
3. Gas sterilization with ethylene oxide, using an approved gas sterilizer and appropriate monitoring systems to assure sterility and personnel safety. All materials sterilized by ethylene oxide require safe airing time.

The most effective method of gas chemical sterilization presently available is the use of ethylene oxide (ETO) gas. ETO gas sterilization should be used only for material and supplies that will not withstand sterilization by steam under pressure. Never gas-sterilize any item that can be steam-sterilized. The concentration of the gas and the temperature and humidity inside the sterilizer are vital factors that affect the gas-sterilization process. ETO gas-sterilization periods range from 3 to 7 hours. All items gas-sterilized must be allowed an aeration (airing out) period. During this period, the ETO gas is expelled from the surface of the item. It is not practical here to present all exposure times, gas concentrations, and aeration times for various items to be gas-sterilized. When using an ETO gas-sterilizer, you must be extremely cautious and follow the manufacturer's instructions carefully.
Cold chemical sterilization.
Effective and proper use of chemical sterilization is dependent on many factors, including: 1) The use of chemicals classified as sterilants. Those classified as disinfectants are not adequate. 2) The physical properties of the item(s) being sterilized. It must be relatively smooth, impervious to moisture, and be a shape that permits all surfaces to be exposed to the chemical sterilant. 3) Exposure a) All surface, both interior and exterior, must be exposed to the sterilant. Tubing must be completely filled and the materials to be sterilized must be clean and arranged to

assure total immersion. b) The items being sterilized must be exposed (immersed) to the sterilant for the prescribed period of time . Always follow manufacturer's instructions. To prevent corrosion, instruments should not be "stored" in the sterilant. 4) Use of fresh solutions. The sterilant solution must be clean and fresh. Most sterilants come in solutions consisting of two parts that, when combined together, form what is referred to as an activated solution. The shelf life of activated solutions is indicated in the instructions for commercial products. Generally, this is from one to four weeks. 5) Rinsing chemically sterilized items prior to use in the surgical procedures. Instruments, implants, and tubing (both inside and out) must be rinsed with sterile saline or sterile water prior to use to avoid tissue damage to the animal. B. There are many acceptable commercial sterilants available and their use is encouraged over making up solutions from basic ingredients. Only products classified as sterilants are to be used for sterilizing instruments and implants for surgery. These products must be used according to the manufacturer's recommendations to ensure adequate sterilization. Alcohol is not reliable as a fungicide or virucide and is ineffective against spores. Alcohol is not stable and loses effectiveness through evaporation. As such, alcohol should not be used as a cold sterilant.

V. Materials of activation of students

(questions, tasks, controversial situations, illustrative materials and other).

VI. Materials of selftraining of students on the topic of lecture: literature, questions, tasks.

Literature

1. Ганіткевич Я. Історія Української медицини в датах та іменах.-Львів, 2004.- 368 с.

2.Черенько М. П., Ваврик Ж. М. Загальна хірургія з анестезіологією, основами реаніматології та догляду за хворими. –К.: Здоров’я, 2004. –616 с.

3.Гостищев В. К. Общая хирургия Учебник для медицинских вузов. 4-е изд.,перераб., доп. и испр.- М.: ГЭОТАР-Медиа,2006.- 832 с.

4.Гуманенко Е.Очерки истории российской военно-полевой хирургии в портретах выдающихся хирургов// М.:Фолиант, 2006.- 344 с.

5.Мирский М.Б. Хирургия от древности до современности: Очерки истории. — М.: Наука, 2000. — 798 с.

6. Петров С.В. Общая хирургия. Учебное пособие. 3-е изд.,перераб. и доп. – М.: ГЭОТАР-Медиа, 2007 – 768 с.

7. Al-Damouk M., Pudney E., Bleetman A. Hand hygiene and aseptic technique in the emergency department //J Hosp Infect.- 2004. – Vol.56, N2. – P.137-141.

8. Beauchamp T., Childress J. Principles of biomedical ethics.-Oxford: Oxford University Press.- 2001.- 432 p.
9. Bunn F., Handscomb K. Prophylactic antibiotics to prevent surgical site infection after breast cancer surgery //Cochrane Database Syst Rev.- 2006, Vol.19, N2.- P.CD005360.

10.Guenaga K., Matos D., Castro A. Mechanical bowel preparation for elective colorectal surgery //Cochrane Database Syst Rev. –2005. – Vol.25. N1. -CD001544.

11.Joseph Lister – The Father of Antiseptics // By Peggy J. Parkes. Blackbirch Pr Inc, 2005.

12. Kallen A., Wilson C., Larson R. Perioperative intranasal mupirocin for the prevention of surgical-site infections: systematic review of the literature and meta-analysis //Infect Control Hosp Epidemiol.- 2005.- Vol.26, N12. – P.916-922.

13.Knut H. The Illustrated History of Surgery. New York: Bell Publishing, 1988.
14.Leong G., Wilson J., Charlett A. Duration of operation as a risk factor for surgical site infection: comparison of English and US data// J Hosp Infect.- 2006.-Vol.63.- P. 255-262 .

15. Niel-Weise B., Wille J., Van den Broek P. Hair removal policies in clean surgery: systematic review of randomized, controlled trials //Infect Control Hosp Epidemiol. – 2005.- Vol.26, N12. – P.923-928.

16.Odom-Forren J. Preventing surgical site infections //Nursing.- 2006.- Vol.36, N6. – P.58-63.
17. Sabiston Textbook of Surgery //by Courtney M. Townsend, R. Daniel Beauchamp , B. Mark Evers, Kenneth Mattox.-Saunders; 17 edition (June 11, 2004).- 2416 p.
18. Schwartz's Principles of Surgery, 8/e (Schwartz's Principles of Surgery)// by F. Charles Brunicardi , Dana K. Andersen, Timothy R. Billiar, David L. Dunn, John G. Hunter , Raphael E. Pollock .- McGraw-Hill Professional; 8 edition (October 14, 2004).- 2000 p.

19.Tanner J., Parkinson H. Double gloving to reduce surgical cross-infection //Cochrane Database Syst Rev. –2002, Vol.3.- CD003087.

20.Tanner J**.**, Woodings D**.**, Moncaster K. Preoperative hair removal to reduce surgical site infection //Cochrane Database Syst Rev.**-** 2006.**-** Vol.19, N2.-CD004122
21. Webster J., Osborne S. Meta-analysis of preoperative antiseptic bathing in the prevention of surgical site infection //Br J Surg. –2006.- Vol.93, N11.- P.1335-1341.

22.Webster J., Osborne S. Preoperative bathing or showering with skin antiseptics to prevent surgical site infection //Cochrane Database Syst Rev. –2006.-Vol. 19, N2.- CD004985

23.Weil P., Buchberger R. From Billroth to PCV: A century of gastric surgery //World J Surg.- 1999. – Vol.23. – P.736-742.

A lecture is prepared on materials of meeting of cyclic methodical commission of Bogomolets National Medical University from 21 June 1998 in conformity with recommendations of Department of pedagogics and pedagogical psychology (associate professor Mileryan V.E.)