

STERILE PROCESSING BASIC TRAINING: SPD BOOT CAMP®

Module #2a:
*A Brief Historical Survey of the Development of
Sterile Processing*

by

The Central Sterile Processing Initiative

Sterile Processing Basic Training: SPD Boot Camp

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Message From The Central Sterile Processing Initiative Director

Thank you for purchasing this e-course, an introductory and review survey of the basics of sterile processing, *Sterile Processing Basic Training: SPD Boot Camp*.

Thank you, enjoy the program, and I am always just an e-mail away if you have questions or need my assistance during the course of your studies.

Sincerely,
Shane Huey,
Director

www.centralsterileprocessing.net

Preface

This e-course is neither the traditional textbook nor the typical student workbook. It is, rather, a combination of the best and most relevant of information related to the basics of sterile processing education and training presented much like a series of lecture notes with multimedia elements included for a more complete and well rounded educational experience for both sterile processing "newbies" and seasoned veterans simply seeking a comprehensive review alike.

The content is structured as a classroom lecture/text with all relevant points discussed and references provided for further information and investigation.

In this text one will be presented with material contained within the industry standard texts, current field relevant articles, and as well have workspace much like contained within the likewise standard workbooks. Herein, however, the student will find no superfluous material to bog one down unnecessarily. Covered within is only that which one needs to know as a sterile processing tech at the level 1 stage—the ESSENTIALS of sterile processing, that which every tech need know—the prerequisites of the field. References will be cited throughout the course, however, to point students in the right direction should they choose (and we are trusting that they will!) to pursue additional knowledge, training, and advancement in the field of sterile processing.

The course consists of multiple individual modules (at least 15 at the time of this printing). Please read through each module from beginning to end at least once before attempting to complete the assignments and then work your way back through the text completing the required coursework specified in the assignment directions at the end of the module (see contents).

Module 2a

Module Objective(s)

- Attain a basic understanding of the historical development of aseptic technology, germ theory, and pre-modern sterilization

A Brief Historical Survey of the Development of Sterile Processing

Introduction

As implied by the module title, this survey will indeed be brief as the material is more comprehensive than can be adequately covered herein within the scope of this course. Nor is a thorough survey herein called for in light of our current intents and purposes. However, it will be interesting for many of us in our profession (and those new to the profession) to have at least a basic, rudimentary understanding of from where aseptic technique and sterilization arose in relation to clinical practice in the OR and sterile processing.

It is argued that sterilization, in the modern healthcare setting at least, began in 1933 with AMSCO's release of the first commercially viable steam autoclave that allowed for accurate measurement of chamber temperature, one of the four most important parameter variables in the steam sterilization process. AMSCO quickly became the industry standard in steam healthcare sterilization and remains so today (though the company is now the STERIS Corporation) (Chobin 2, Perkins 38).

Prior to the institution of autoclave temperature monitoring by means of thermometer, the primary metric monitored was that of pressure, which clearly limited insight into the activity of the steam within the autoclave chamber (Perkins 38). As the physics of pressure in utilization of steam for sterilization are commensurate with the physics of temperature (more in this in upcoming sterilization modules), there was some good guesswork as to what was occurring within the sterilization chamber but of course the modern notion of sterilization validation could not yet be had.

The Central Nature of Central Service

The model of sterile processing centralization in the hospital, most commonly in the OR or perioperative setting, is attributed to the

American College of Surgeons (Chobin 2). Prior to this, most of a facility's reprocessing services were performed in the department that utilized the products in need of reprocessing or solely in the operating room (Perkins 362). Sterilization typically occurred in the area of utilization or OR as well (Chobin 2).

This was more readily accomplished at the time (prior to 1940) as surgical volume wasn't what it is today nor was the surgical repertoire as varied and advanced as one finds today in the modern, technologically advanced, state-of-the art OR suite.

One of the primary reasons for centralization on the part of early pioneers of what would be come known as "central services" and, later, "sterile processing" was simply to standardize processes and practices to achieve a uniform quality of end product. One such early pioneers of central sterile processing was Weeden (W.B.) Underwood (1880-1946). Underwood contributed substantially to the development of the modern steam autoclave and published *Textbook of Sterilization*, a once standard text (Perkins 41).

Another proponent and voice of centralization with specific directions for successful implementation was the scientist in the employ of AMSCO by the name of John J. Perkins. Perkins penned the now the classic text on sterilization in the healthcare setting, *Principles and Methods of Sterilization in Health Sciences*¹, a text that should be required reading for all sterile processing professionals.

1 Perkins, John J. *Principles and Methods of Sterilization in Health Sciences, Second Edition*. Springfield: Thomas Publishers, 1983. Available through various healthcare book vendors such as [AORN](#).

Timeline

It began with the rise of mankind (seriously!) as since the beginning of recorded history it seems that mankind has practiced, in some form or fashion, purification (most often involved in or related to ritual, particularly ritual of the religious type). Ancient rituals often involved fire, and purification by fire can be seen as the precursor to modern heat-oriented sterilization methodologies.

Below are but a few examples of the knowledge held by the ancients on aseptic technique and antiseptics:

- ~2000+ BC: Ancients had discovered that running water reduced the incidence of infection and disease, that isolation prevented certain types of disease transmission (e.g., leprosy), and that a system of sanitary latrines prevented spread of sickness as well

- ~500 BC: Boiled water and wine were being utilized as topical wound disinfectants by the great physician Hippocrates (CCI p. 11).

- ~450 BC: The Egyptians had established that eliminating moisture functioned as an aid to antiseptics via both dry air and the use of various agents such as salt and niter (Perkins 3). Though fire had been utilized prior to the Egyptians it is believed for purification (primarily ritual), the Egyptians seemed to have recognized its power in cleansing as manifest in their burning of diseased corpses and dead fallen in war (Perkins 4).

- Marcus Terentius Varro (117-26 BC), a physician to Caesar, postulated an early version of the germ theory of disease transmission--"Small creatures...cause dangerous diseases" (Perkins 3).

- In 1546, the individual recognized as the first epidemiologist postulated "seeds of disease" that are transmitted via direct contact, indirect contact, and via distance (i.e., via exposure to the "seeds of disease" by touching vessel of transmission, touching object exposed to vessel of transmission, or airborne

transmission from a distance) (Perkins 4).

- 1683: Bacteria first seen with the naked eye by Antonj van Leeuwenhoek, a Dutch draper who utilized specialized lenses to observe microbial life. Leeuwenhoek termed the microbes (a term itself not yet invented at this point) "animalcules" (CCI 11).
- 1700s: L. Spallanzani observed that microbes could be killed utilizing heat and, particularly, via boiling (CCI 11, Perkins 5).
- 1836: Agostino Bassi first to conclusively prove that microbes were integral in the cause and spread of disease (CCI 11).
- Mid 1800s: Individuals began to correlated specific temperatures with microbial death (CCI 11).
- 1860s: Considered the "turning point" (CCI 11) in the theory of germ transmission as notions of contagion and mitigation of transmission emerged via the work of, particularly, Semmelweis, Pasteur, and Lister (CCI 11).

More of the Story...

The ancients, most particularly the Egyptians and the Greeks, had discovered that various chemicals and substances could be utilized for antiseptic purposes including: pitch, tar, salt, niter, and sulfur to name but a few of those more commonly used. Agents were also utilized that produced strong aromas (e.g., as with vinegar and sulfur) though to lesser effect. Such agents were common components of the embalming process (mummification) (Perkins 3).

Modern germ theory is not in fact so modern! One of Caesar's private physicians, Marcus Terentius Varro (circa 120 B.C.) speculated that small creatures unseen by the naked eye are responsible for the spread of disease. Despite this brilliant insight for the day, further developments of the theory would not occur until many years later with Fracastorius (considered the first epidemiologist) and his postulation of an airborne mechanism of disease transmission (circa 1546) (Perkins 4-5, CCI 11).

Shortly thereafter Fracastorius' postulation of a rudimentary epidemiology, in 1683 Leeuwenhoek, a Dutch draper, would discover large bacteria as he developed ocular lenses capable of seeing these forms of life (serendipitously as is so often the case). His discoveries launched the science of microbiology (though the term "microbe" wasn't coined until 1878). As well, Leeuwenhoek has also been credited as the first person to view blood cells (Perkins 5, CCI 11).

An early theory on the generation of life was that *spontaneous generation*, essentially the view that microbiological life emerged spontaneously (i.e., of its own accord, without external cause, and not via transmission of life from life). It was observed by some, e.g., George Buffon (1707-1788) that spontaneous generation was reduced or done away with all together when matter (from which organisms previously "spontaneously" emerged) by boiling, an early form of disinfection and sterilization (Perkins 4-8).

Louis Pasteur confirmed and added to the previous discoveries and advancements and it was his contributions that led to the invention of the first steam sterilizer by one of his own students, Charles Chamberland in 1880. This first sterilizer resembled nothing more

than a modern pressure cooker. The sterilizer was rudimentary, but effective at achieving sterilization by steam at pressure. The only down side was that the levels of steam under pressure led to damage of heat-sensitive items (this is still an issue today) (Perkins 8-12).

It was a man by the name of Ignaz Semmelweis, a Hungarian physician, who in 1847 required of all students at the maternity hospital in which he worked, cleanse their hands in a solution of lime chloride before moving from one patient to the next. This simple insight and implementation led to a drop in mortality rate from 18% to ~1% over the course of one year! Believe it or not though, Semmelweis was criticized and ostracized for his contribution as it wasn't widely accepted by his colleagues (Perkins 12-13).

On the way towards pre-modern sterilization several factors must be first considered: The heat resistance of bacteria discovered by John Tyndall, a physicist, in 1876; German improvements on Chamberland's sterilizer; and Joseph Lister's antiseptic theories of surgery. These will be covered in the next module, 2b.

Required Readings, Recommended Readings, and Other Resources

Required Reading

Module 2a

["History of Aseptic Technique"](#)

["Sterilisation and Disinfection"](#)

Recommended Reading

Perkins, John J. Principles and Methods of Sterilization in Health Sciences, Second Edition. Chapter 1.

Recommended Links

n/a

Module Assignments

Module 2a Assignments

- 1) Read the module in its entirety from cover to cover at least once.
- 2) Write a 2-3 paragraph essay (all essays to be completed in Word, Works or similar, common word processing/text application) tracing the development of aseptic technique from ancient times to the last period discussed in the module.
- 3) Discuss, from what you understand from the text, the relationship to be between aseptic technique and sterilization. Explain in detail.
- 4) Do a web search for 2 websites related to aseptic technique (not from among those listed above; one ancient and the other modern) and type the URL (web address) into a document. Briefly describe at least 3 things you learned about the topic on each site (state something not covered in the current module).
- 5) Visit www.YouTube.com and search for a video related to aseptic technique in the operating room. Pick one that interests you and then, in a text document, describe what you learned from the video.
- 6) Take the module quiz (posted online separately 3-5 days after posting of this module). Submit with above documents to info@centralsterileprocessing.net. In subject line, type "Module 1 Assignments." In body of e-mail, submit full name.

END MODULE 2a