



## 1

# From formalwear and frocks to scrubs and gowns: A brief history of the evolution of operating room attire



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Most of the knowledge of the history of surgical attire is derived from drawings, paintings and anecdotal reports. Although conventional today, “scrubs” were not routinely worn until the mid-20th century. In the 19th century, it would be commonplace for a surgeon to shrug off his suit jacket, roll up his sleeves, throw on a frock or apron, and begin operating. Over the years, surgical garb continues to evolve to make procedures safer for both the patient and the surgeon. This paper will serve to outline the interesting evolution of operating room attire.

## Introduction

Stroll into any operating room and you will find surgeons adorned in various shades of blues and greens along with their masks, scrub hats, and surgical gowns. The surgical attire that has become commonplace throughout operating rooms around the world, has only been around for less than a century.

## A brief surgical timeline

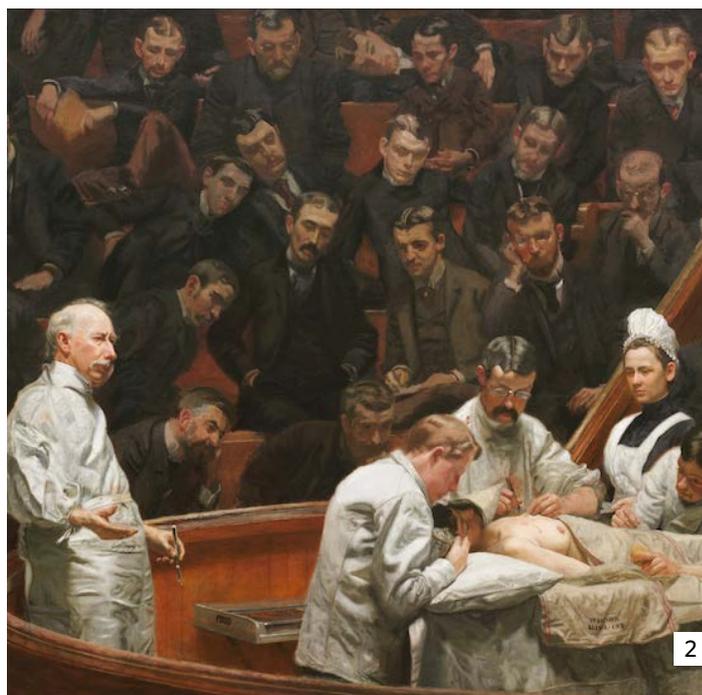
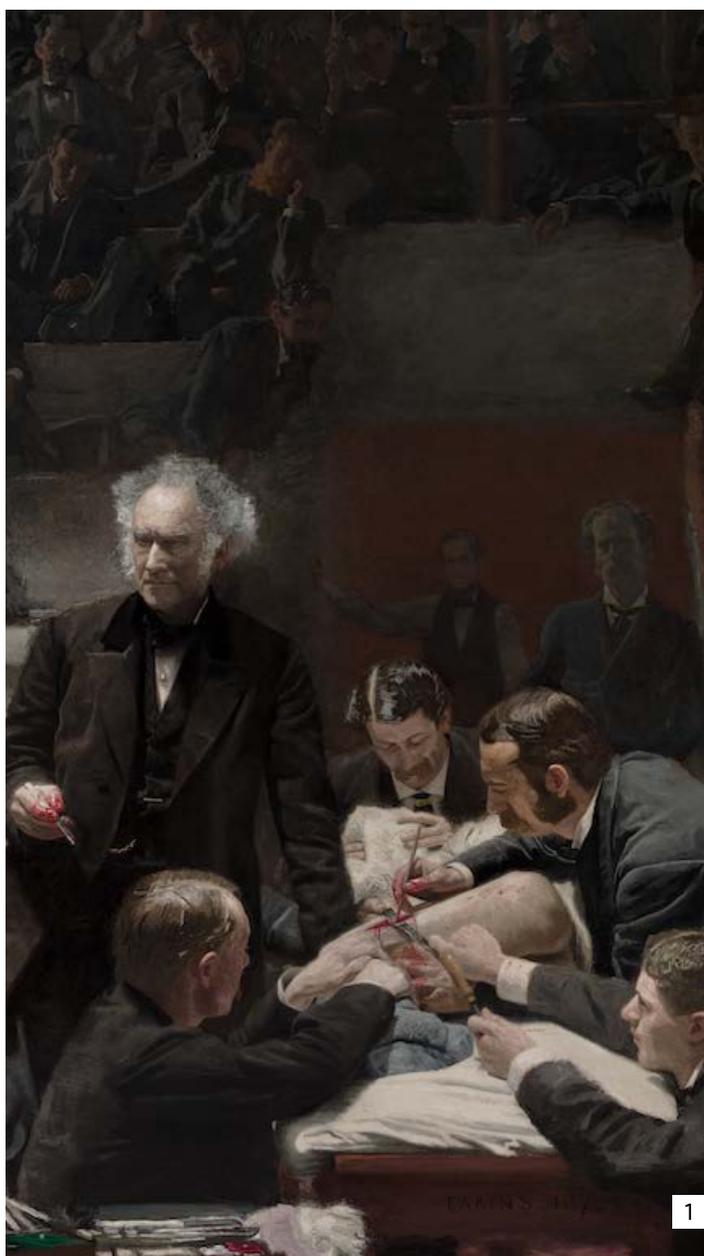
**Prior to 19th century** - Surgeons performed operations in their street clothes with the only concessions being the removal of coats and rolling-up of shirt-sleeves during bloody procedures.

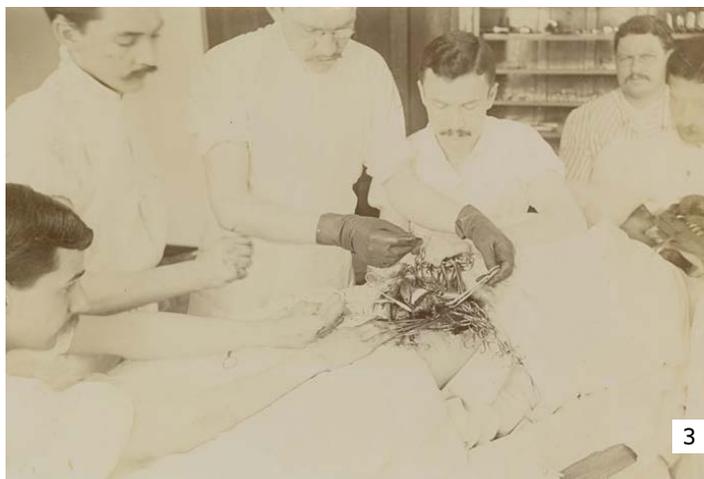
**Early 19th century** - Surgeons often wore black “frock coats” to reflect respectability and the “somber nature of their work,”<sup>1</sup> leading to the perennial surgical story of the frock coat “stiff with caked blood”<sup>2</sup> (Figure 1).

**Late 1870s** - Lister covered his waistcoat and trousers with an “ordinary unsterilized huckaback towel for his own protection not that of the patient.”<sup>3</sup>

**1883** - German Surgeon, Gustav Neuber of Kiel, was the first to use a sterilized surgical gown.<sup>4</sup>

**1885** - Lucy Osburn, Lady Superintendent of Sydney Hospital, wrote to Florence Nightingale about the outfits worn by surgeons in the operating theatre: “The doctor and all his assistants take off their coats and have tied round them garments of white makintosh which cover them from chin to toes, and over this a shift- a kind of white cotton surplice with loose sleeves coming to the elbows, this latter changed after each case” (Figure 2).<sup>5</sup>





3

**1893** - Halsted's senior resident, Dr. Joseph Bloodgood (Figure 3), noted that the practice of gloving the surgical team dramatically decreased infection rate but surgeons reluctant because gloves led to an "impaired sense of touch".<sup>4</sup>

**Early 1900s** - The Spanish flu" pandemic and growing interest in Lister's germ theory led to some surgeons wearing cotton masks in surgery to protect themselves from diseases.<sup>6</sup>

**1916** - The technique of "donning gloves" during surgery first appears referenced in texts.<sup>6</sup>

**1920s** - The use of masks becomes routine practice in the operating room.<sup>2</sup>

**1939** - Devenish and Miles showed that when the wrists of a cotton gown became wet during an operation, skin microorganisms which may infect the patient pass readily through the material. By equipping the surgeon with waterproof over-sleeves Devenish and Miles prevented wetting of the sleeves.<sup>6</sup>

**1940s**- Advances antiseptis and wound infection led to antiseptic drapes and gowns become adopted.

**2016**- American College of Surgeons announces new guidelines for surgical attire.

## The evolution of scrubs

Originally known as "surgical greens" because of their color, this form of attire has now colloquially been termed "scrubs" because of the simple notion that they are worn in a "scrubbed" environment. The first mention of scrubs was in 1894 when Dr. Hunter Robber stated, "It is safer and better that all should put on a complete change of costume rather than simply don a sterilized coat and pair of trousers over the ordinary clothing." He also suggested this attire be made white so that it can easily be washed.<sup>7</sup>

When electricity took hold and more lights were used operating rooms rather than relying on windows and skylights, the combination of bright lights and white attire led to significant glare and "there was a green ghosting effect when shifting gaze from bloody red innards to white backgrounds."<sup>2</sup>

In 1914, San Francisco surgeon Harry Sherman, believed that a color scheme might evolve from the red of blood and tissues. He recommended green, a color "less wearisome to the eyes and [one that] minimized reflection." He further suggested that green "keeps the surgeon's eye acute to red and pink."<sup>8</sup> "Ciel" (sky) blue became popular as a color for surgical apparel in the 1950s, when color television began to be used for videotaping and closed-circuit teaching.<sup>9</sup>

## Where we are today

Attire has been a new significant focus of the American College of Surgeons (ACS). In 2016, the ACS announced specific guidelines for appropriate surgical attire reasoning that these guidelines are based on decorum, professionalism, common sense, and available evidence.<sup>10</sup>

The statement in its entirety can be viewed on the ACS website.<sup>10</sup> Some highlights include the notion that operating room scrubs should not be worn outside the hospital perimeter and should be changed at least daily. Scrubs worn outside of the operating room suite should be covered up with a white coat or other appropriate cover. Masks should never be worn dangling at any time. In addition to promoting patient safety, the ACS guidelines uphold a culture of professionalism.<sup>10</sup>

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## Legend

- 1 Thomas Eakins, *The Gross Clinic* (1875). Samuel Gross (1805-1884) wears a frock coat during surgery, as do all of his attendants. Gross expressed skepticism regarding Lister's use of carbolic acid and the latter's antiseptic system. Image courtesy of the Philadelphia Museum of Art.
- 2 Thomas Eakins, *The Agnew Clinic* (1889). D. Hayes Agnew (1818-1892) was among the first in the U.S. to adopt Listerism. All members of his team wear clean white gowns. None wear gloves. Image courtesy of the University of Pennsylvania Art Collection, Philadelphia, PA.
- 3 Surgeon Joseph Bloodgood (third from left) wearing gloves during an operation, 1893. One of the first operations where the surgeon wears rubber gloves. Image courtesy Alan Mason Chesney Medical Archives, Johns Hopkins Medical Institutions.