

Review of the Technology Behind the Protective Cap Used on Intravenous (IV) Fluid Bottles

Dr. Santoshi Sakharani¹, Rajkailsh Kothari², Promila³, Tejas Bhosale⁴

Professor¹, Students^{2,3,4}

Department of Mechanical Engineering

Pranveer Singh Institute of Technology, Kanpur

Corresponding Author's Email: - rajkailashkothari5@gmail.com

Abstract

The requirement for consistent quality, standardization, safety, and low-cost medical components has become a significant challenge for industries' survival in the global medical component market. Companies' applications are heavily reliant on the success of design, manufacturing, and marketing strategies; this is the only way to achieve market success, and research and development teams should be considered as well. Different companies have been established to meet these requirements in order to remain competitive in the market. Frequently, the design and manufacturing operations used to produce medical plastics for the health care market must be adjusted on a daily basis in order to meet increasingly stringent, government-regulated, bio-medical requirements, in addition to all other market pressures. As a result, medical plastics are constantly looking for more systematic ways to improve product quality and produce more at a lower cost, as it has now become an important factor to consider in accordance with customers.

Plastic is now used to replace MS, aluminium, glass, and other materials in all manufacturing industries. Because of its ease of manufacture and low cost, aluminium protective caps have largely replaced plastic protective caps in pharmaceutical industries.

Keywords: *Protective caps, intravenous fluid protective caps, intravenous fluids, Medical caps*

INTRODUCTION

In today's fast-paced world, people face a variety of workloads, tensions, and burdens; as a result, they must maintain a vigilant eye on their health on a regular basis. On the other hand, this procedure appears to be time-consuming for working men and women. Furthermore, it has been discovered that people do not want to be attached to measurement devices or be aware of continuous detection and intensive care. Furthermore, people feel more comfortable and safe at home than in hospitals or clinical observation, and as a result, intravenous fluid bottles are used because they can be used at home or in the hospital under the supervision of nurses for the care of patients. These caps are used to protect intravenous fluid bottles from fungi, bacteria, and other microorganisms. As a result, intolerance is one of the enabling concepts in making healthcare measurements a part of our daily lives. Non-invasive and non-contact measurement of vital signs such as respiratory rate, respiratory pattern, pulse rate, blood oxygen saturation, temperature, and blood pressure is important in both medical and routine monitoring, particularly for people suffering from severe diseases. Existing standard devices are contact-based and aggressive in some cases, and aside from X-ray and

radiography, no other non-contact type devices or applications are actually useful, as many of them are fake and useless. The only disadvantage is that it is a contact type, but the advantage is that it is very helpful in many situations by improving immune power. It can also be said that it is given to patients who do not eat or drink anything.

This manuscript is organized as follows: protective caps, cap types, intravenous fluids, medical malpractice and damaged caps, intravenous fluids on the blood level, reviews, conclusion, and references.

Protective cap (P-CAPS)

Designers and employees from various companies have created protective caps for the protection of intravenous fluids from germs, bacteria, fungus, dust, and so on, and these intravenous fluids protect patients by providing a certain amount of immunity from certain infectious bugs by increasing their immunity because they are not eating or drinking anything that is actually essential for them when they eat or drink certain things. The cap also required rib due to fitment issues that were reported by a number of customers as the weight and thickness of the cap increased, and changes were made in the software to

meet the demands of the customers as well as the company.

To increase the thickness and weight of the cap, changes must be made in the punch and mould used in its manufacture. Fluids will flow around the ball check valve because it prevents fluid from leaving the bottle but does not prevent fluid from entering the bottle. If the fluid is desired to be removed from the bottle, it can be done slowly by inverting the bottle and opening any closures on the tube. Sometimes, additions were made by using a different type of piercing spike that is not the piercing spike used to withdraw liquid from the bottle when in use.

This procedure, however, has drawbacks because it requires a second piercing of the stopper, which is undesirable. A protector cap with a puncturable section in a container wall and a cylindrical neck portion projecting from the periphery of the wall section for establishing a sterile seal over a port. A moulded housing with a ring-shaped recess for sealingly engaging the neck member and a chamber formed at least partially within a compressible handle portion comprises the cap. Prior to inserting the cap on the neck portion of the port, the handle portion is compressed and then released to create a partial vacuum in

the chamber. The partial vacuum aids in the retention of the protector cap and prevents trapped air from forcing the cap off during subsequent heat-sterilization of the container. One issue with this arrangement was the necessity of tightly affixing the protective cap to prevent it from falling off during transit or storage, which is why, as previously stated, ribs are used. Even the most effective seal arrangement becomes unsatisfactory and potentially dangerous when it is too difficult or time-consuming to remove, as attention may be diverted from the patient undergoing treatment.

The impossibility of determining whether the sterile condition in the container port has been maintained has been the impossibility of assemblies. Another issue with prior art protector caps is that when they were first installed on a container neck portion, they trapped and compressed air within the neck portion. When the container was heat-sterilized in an autoclave, the trapped compressed air expanded and loosened or blew off the caps. As a result, the present invention is broadly directed to a new and improved protector cap for maintaining a seal at a fluid container's port. The invention is also directed to a new and improved cap for maintaining a vacuum over a fluid

container's puncturable membrane portion of the port. The invention also includes a new and improved protector cap.

Types of cap

There are many different types of caps available on the market today; it can also be said that the caps play a minor role, but this is important in the medical market. Caps are available based on the type of bottle, which is primarily of two types: with neck and without neck. Bottles with necks have many different types of caps available, each designed to maintain their monopoly in the market, and for neckless bottles, there are Euro head caps that actually increase monopoly. However, both play an important role in the medical market, particularly in the medical bottle cap market. The figures depict the various types of caps that are available.



Fig 1 Euro-head cap available in the market (medical healthcare

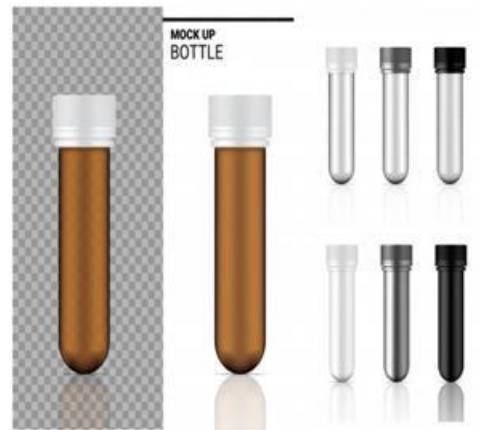


Fig 2 Other types of caps available in the market (google images)

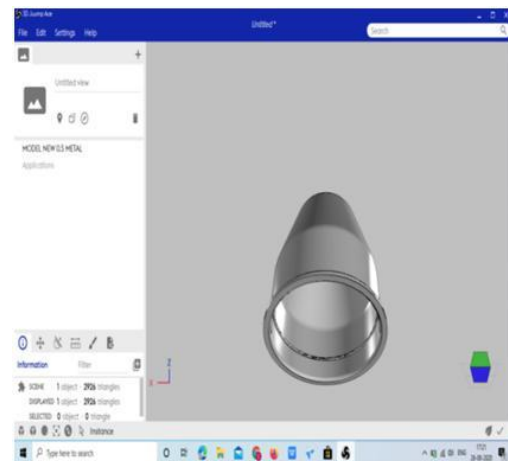


Fig 3 Cap with RIB, increased thickness and increased weight with the extension of collar

Intravenous Fluids

There are many different types of intravenous fluid, but these four are the most commonly used.

1. 0.9% Normal Saline (NS, 0.9NaCl, or NSS).
2. Lactated Ringers (LR, Ringers Lactate, or RL).

3. Dextrose 5% in Water (D5 or D5W, an intravenous sugar solution).
4. 0.45% Normal Saline (Half Normal Saline, 0.45NaCl)

In the field of surgery and healthcare, an intravenous injection closure device is used. A dual flow device with a piercing spike is often punched through the stopper. The contents of the bottle are frequently not administered as produced by the production laboratory but rather are inputted according to demand. Depending on the patient's needs and the sickness or disease he has, a physician may recommend additives to be added to the solution. Placing a syringe at the open end of the air route allows the additives to be delivered into the bottle. Intravenous fluids are liquids administered to replace water, sugar, and salt that you may require if you are ill, undergoing surgery, or unable to eat or drink regularly. IV fluids are injected directly into a vein through a drip.

In addition, intravenous treatment can be employed in a variety of medical situations for some patients. When an additive must be injected into a bottle while it is in use, the only process available is to remove the air filter from the atmosphere, inject the additive through the ball check valve, and then restore the air filter. This necessitates

not only that the container and its contents be sterile and sealed when received by the user but also that the contents be free of contamination when opened by a physician or medical technician before use. The problem of maintaining sterility is particularly acute at the container port, where the point of the cannula of an administration set or other flow system punctures the container wall to allow removal of the fluid because contamination accumulated on the container housing during transport or storage may be introduced into the container by the cannula.

Medical malpractice and damaged caps

This study looks at legislation, and judicial opinions that limit jury awards in medical malpractice cases, outlines the damages caps and looks at how research influences policy decisions made by courts and legislatures. Damage caps have sparked debate over whether they lower malpractice rates, how they might affect medical errors, and whether they fairly compensate harmed patients, all of which are relevant considerations. Physician associations formed mutual insurers in the 1970s in response to a lack of malpractice insurance coverage. Commercial and mutual insurance typically determine premiums based on geographic location

and speciality area rather than on previous claims filed by particular physicians. However, these are not covered by standard insurance. The difference is that economists used an econometric method rather than an accounting one. Researchers recommend that a randomly selected state implement the new statute with no other changes throughout time as the reform played out to assess the effect of tort reform and determine whether or not the statute had an influence. They'd then compare the frequency and size of claims, the size of jury awards, and the premiums charged to physicians before and after the statute was passed.

Several research has used a method that appears to be comparable to this but with varied results. These studies have the potential to be flawed since they do not take into account other factors that may have changed over time or differences between states other than the passage of damages capping laws. The question of whether caps reduce awards and judgements is still debated. Some studies reveal that caps, contrary to popular belief, can actually raise loss payouts, which is right, and this is why caps are so crucial.

Impact of intravenous fluids on blood glucose levels

Intravenous fluids (IV fluids) are an important aspect preoperative care. The goal of this study was to see how different maintenance fluid regimes affected intra-operative blood glucose levels.

During the intraoperative and immediate postoperative periods, a considerable increase in level was seen. Intravenous (IV) salt solutions were originally used to manage fluid loss due to cholera in the 1830s, and IV saline was first given to surgical patients in the late 1800s. IV fluid administration is nearly universal for patients undergoing major surgeries, where it meets the need to maintain intravascular volume at a time when it may be depleted due to preoperative fasting, surgical blood loss, evaporation, urinary excretion caused by anesthesia, fluid loss into the third space, and albumin leakage caused by inflammatory mediators.

Shoemaker pioneered the notion of fluid resuscitation aimed at supra-normal parameters in the 1970s and 1980s. From a metabolic standpoint, operations are usually seen to involve a combination of many elements such as tissue injury, fasting, blood loss, pharmaceutical side effects, and temperature changes. The

stress reaction following surgery is marked by increased pituitary hormone release and sympathetic nervous system activity. General anaesthesia has been demonstrated to cause a higher blood glucose content than local or epidural analgesia, which is the primary cause of the patient's causing loss.

Research Gap

The research study reveals that protective cap polypropylene H110MA material is employed in the production process. Plastic is a low-cost, easy-to-manufactured material. In the past, aluminium caps were commonly used to cover IV fluid bottles; however, due to the ease with which plastic protective caps may be removed from IV fluid bottles, plastic protective caps are now commonly utilized in IV fluid bottles. When using protective caps on IV fluid bottles, fitment issues can occur; as a result, we must make design changes to ensure a better and proper fit of the cap with the bottle.

CONCLUSION

In accordance with their therapy, the caps are utilized to preserve intravenous fluids as well as patients. It is also useful for satisfying customers. Thus changes in appearance are made with difficulties linked to fitment, which is a crucial part of

intravenous fluid protection. The intravenous fluid is also an important component since it gives immunity. Other liquids may be injected into the intravenous fluid depending on the patient's needs and the doctor's recommendation. It is often said that sufficient medical insurance is required to prevent or minimize medical negligence. As a result, it can be argued that caps constitute a tiny but vital component in medical applications.

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