Clinical Journal of Diabetes Care and Control
ISSN: 2642-0872

Short Communication *Volume 4 Issue 1*

The Brief History of Injections, First Do Not Harm

Imam S[1], Mukherjee D[1]*, Harikrishnan SN[1] and Sinha AR[2]

[1]Jinan University, PR China

[2]Geomedi Teaching University, Georgia

***Corresponding author:** Dattatreya Mukherjee, Undergraduate Medical Researcher, Jinan University, Guangzhou, P.R China, Email: dattatreyamukherjee4u@outlook.com

Received Date: March 07, 2021; **Published Date:** March 18, 2021

Abstract

Injections are one of the most common, effective, reliable and low cost medical/ health care procedures accepted all around the world. Injections for early transfusion, anaesthesia, and surgical operations such as venous sclerotherapy arose from this. Syringes have been designed to inject particular narcotics. Indeed, there are few medical tools so common and yet so indispensable, as the plastic disposable syringe and needle. However, it took thousands of years for injections to get to where it is today. This article would trace the evolution of syringe from ancient times to the present and would also highlight about the possible risk of infections related to unsafe disposal of used syringes and needles and injection safety.

Keywords: Injection Safety; Infections and Injuries

Abbreviations: HCV: Hepatitis C Virus; HBV: Hepatitis B Virus; NSI: Needle Stick Injury; WHO: World Health Organization; SIGN: Safe Injection Global Network.

Introduction

The word "syringe" is derived from the Greek word syrinx, meaning "tube" [1,2]. The structure and design of syringe is quite simple and yet effective as a medical tool. A syringe is like a simple pump with a tight plunger that fits into a cylindrical tube. The plunger can be pulled and pushed allowing the syringe to pull in or push out a liquid or gas through the open end of the tube that may be attached with a hypodermic needle [2].The first syringes were used in Roman times (1st Century AD) and are mentioned in a journal called "De Medicina" as being used to treat medical complications [2]. Simple piston syringes were used to deliver ointments and creams were described by Galen (129-200 CE). An Egyptian, Ammar bin Ali al-Mawsilli was reported using glass tubes for suction for cataract extraction from about 900 CE [3]. In 1650 Blaise Pascal's experimental work in hydraulics led him to invent the first modern syringe which allowed the infusion of medicines [2]. By 1660 Esholttz and Drs Major used injections on humans with fatal results due to ignorance of suitable dosage and the need for sterilization and infusion. Hence the disastrous consequences of these experiments delayed the use of injections for around 200 years [3]. An Irish physician named Francis Rynd invented the hollow needle and used it to make the first recorded subcutaneous injections in 1844 [3]. In 1853 Charles Pravaz and Alexander Wood developed a medical hypodermic syringe with a needle fine enough to pierce a skin [3]. Alexander Wood injected morphine into humans to treat nerve conditions and his wife subsequently became addicted to morphine and is recorded as the first woman to die of an injected drug overdose [4]. In 1899 Letitia Mumford Geer of New York was granted a patent for a syringe design that permitted the user to operate it one-handed [2].

In 1946 Chance Brothers in England made the first all-glass syringe with an interchangeable barrel and plunge and this was revolutionary as mass-sterilization of different components became possible without needing to match up the individual parts [2]. Then shortly thereafter Australian inventor Charles Rotha user created the world's first plastic, disposable hypodermic syringe made from polyethylene in

1949 [2]. Two years later he produced the first injection-molded syringes made of polypropylene, a plastic that can be heat-sterilized. Then in 1956 a New Zealand pharmacist and inventor Colin Murdoch got patents for disposable plastic syringe followed by Becton Dickinson in 1961 and an African American inventor Phil received a US patent for a "Disposable Syringe [2]. The basic design has remained unchanged though interchangeable parts and the use of plastic resulted in universal use of disposable syringes and needles since the mid-1950s. The syringe has become an indispensable instrument for many aspects of interventional medicine and everyday practice.

Some needles from the collection

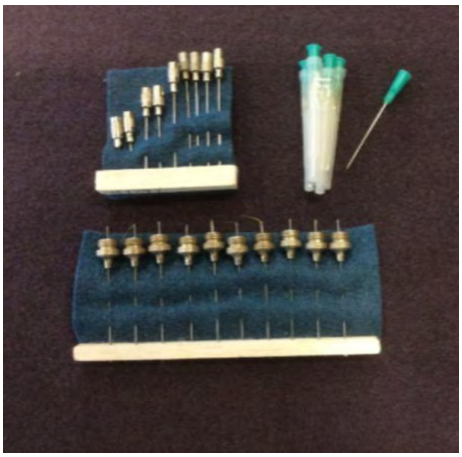

Figure 1: Shows three generations of needles. The top left ones are single-use needles from the 1950s with various lengths and gauges. At the top right is small sample of needles of a currently used type, supplied in a patent wrapper in individual protective sheaths with color coded plastic hubs. Below these are 1930s screw-on double ended needles patented by Boots & Co Ltd to fit their cartridge loading syringes [3].

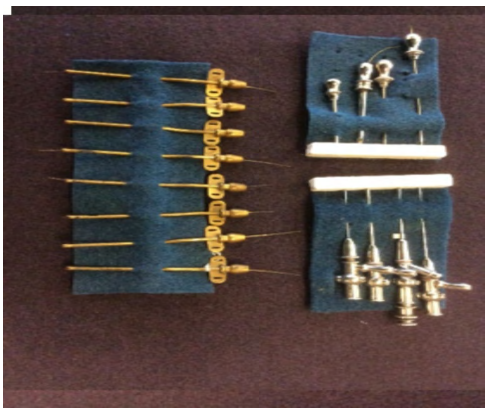

Figure 2: Illustrates infusion needles in which the bulbous hub fits directly on to rubber tubing.

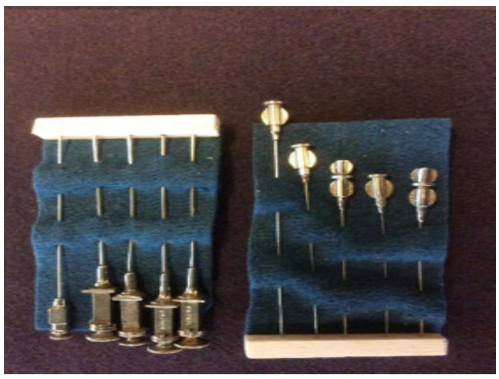

Figure 3: Shows aspiration needles. They have a bevel-pointed introducer to facilitate insertion of the needle.

Figure 4: The needle has a screw fitting like another of the older syringes in the collection with its ferrous metal ends and non-sterilizable, ivory thumb piece on a plunger with a rubber piston.

Figure 5: Top is the Mussel Shell, a pocket-sized syringe set, patented by Burroughs Welcome, about 1910, particularly for use with tabloids, containing a standardized dose of soluble preparations to be injected after dissolving in distilled water. The bottom one is the anaesthetic syringe set used by GPs and specialists.

Figure 6: Top is the copper cased cannulas and the thick metal syringe with a robust screw lock retain heat to enable the injection of melted paraffin wax into hollow organs and vessels for demonstration specimens for morbid anatomy classes.

The bottom one is AGLA Micrometer Syringe Outfit. This was designed for analysis of diluted concentrations of biological fluid components where accurate measurement of precise quantities is required. The enclosed booklet suggests that it was particularly used in immunology research and assessment where serial dilutions are critical

Injection Safety

In health care facility, an injection is the introduction of a drug, vaccine, contraceptive or other therapeutic agents into the body using a needle and a syringe. However, this most common and reliable health care procedures could become the etiology of many infectious diseases to patients or health care workers or result into a hazardous waste for the community. Hence the safe use of this procedure by use of sterilized equipment and safe disposal is of utmost importance. Injection safety includes set of measures taken to perform injections in an optimally safe manner for patients and health care personnel. A safe injection does not harm the recipient, does not expose the provider to any risks and not result in waste that is dangerous for the community. Unsafe and over-use of injections is a common characteristic of health care systems in developing countries. Improper use of syringes and needles have resulted in patient-to-patient transmission of blood borne pathogens such as hepatitis C virus (HCV), hepatitis B virus (HBV) and HIV [5]. A needle stick injury (NSI) is a commonly encountered occupational hazard which may harm the injection provider by transmitting viral infections. The global burden of HBV, HCV and HIV infections due to NSI among health care workers have increased. In 1999, the World Health Organization (WHO) established the Safe Injection Global Network (SIGN), which advocates a range of interventions for the promotion of injection safety [6]. According to WHO, an estimated 16.000 hepatitis C, 66,000 hepatitis B and 200-500 HIV infections each year are caused by occupational exposure to blood [7]. The SIGN alliance includes organizations such as UNICEF, UNAIDS and USAIDS, governments, NGOs, universities and industry groups [5]. SIGN promotes three key strategies for achieving injection safety:

- Behavior change among patients and health care workers to decrease injection overuse and achieve injection safety;
- The availability of necessary equipment and supplies;
- Safe management of sharps waste.

Safe Injection Global Network (SIGN) defines a safe injection as, “the injection that does no harm to the recipient, does not expose the health worker to any risk and does not result in waste that is dangerous for the community” [8]. Patients need to be aware that unsafe injection practices could be a serious threat to life. Both the patients as well as the health care workers should never reuse a needle or syringe either from one patient to another or to withdraw medication from a vial [9]. Both needle and syringe must be discarded once

they have been used. Reusing a needle or syringe can put patients in danger of getting hepatitis C virus (HCV), hepatitis B virus (HBV) and HIV.Unsafe injections were related to the transmission of hepatitis B and C, HIV, Ebola and Lassa virus infections, and malaria in eighteen trials. Five studies linked unsafe injections to 20-80% of new hepatitis B infections, and three studies linked unsafe injections to a significant mode of hepatitis C transmission [10].

Several approaches to promote the injection safety have been suggested which includes widespread use of auto-disable syringes and information, education, communication campaigns to make patients more informed consumers of health care services. For example, it has been suggested that patients should be encouraged to witness needled and syringes being removed from sealed packets prior to consenting to an injection but rarely patients in developing countries have this much freedom to make such demands from their health care workers. In poor and developing countries patients are more likely to encounter unsafe injection practices and in no position to dictate the practices of health care workers. Health care worker have much greater control over the injection encounter and are far better placed to influence the quality of the service and should therefore be the major focus of campaigns to promote injection safety. There is an urgent need to provide health care workers in developing countries with training in injection safety and the practice of universal precautions and an adequate supply of personal protective equipment. Along with training of safe administration of drugs using injection procedures, safe disposal of used needles and syringes is of utmost important to avoid contamination with patients, health care workers, people who finally dispose of hospital waste and with any human being. Health care workers should be trained to immediately dispose used needles and syringes in sharps bins and do not try to take them out again. The sharps bin should be kept in a safe place to avoid risk to other people and is out of sight and reach of children as well. Also used needles and syringes should not be disposed in any type of household bins and wearing of gloves during giving the injection is also very important [11]. The bottom line is that health care workers should get trained before using sharps like needles for injection procedures. Proper training on techniques and equipment specific before conducting the injection procedure avoids risk of avoidable infections and injuries. Also, the patient receiving the injections should make sure that the syringe and needles are being used directly from the sealed packets.

References

1. Myers K (2019) A history of injection treatments - I the syringe. Phlebology 34(5): 294-302.
2. The History of Syringe.
3. Craig R (2018) A History of Syringe and needles.
4. The Social and Scientific aspect of Drug Discovery, pp: 1-49.
5. Pugliese G, Gosnell C, Bartley JM, Robinson S (2010) Injection practices among clinicians in United States health care settings. Am J Infect Control 38(10): 789-798.
6. Kermode M (2004) Healthcare worker safety is a pre-requisite for injection safety in developing countries. International Journal of Infectious Diseases 8(6): 325-327.
7. Gyawali S, Rathore DS, Shankar PR, Kc VK, Jha N, et al. (2016) Knowledge and Practice on Injection Safety among Primary Health Care Workers in Kaski District, Western Nepal. Malays J Med Sci 23(1): 44-55.
8. Network SI. Advocacy booklet. Switzerland: World Health Organization. 2011: 1-25.
9. Centers for Disease Control and Prevention (CDC).
10. Simonsen L, Kane A, Lloyd J, Zaffran M, Kane M (1999) Unsafe injections in the developing world and transmission of bloodborne pathogens: a review. Bull World Health Organ 77(10): 789-800.
11. Sagoe-Moses C, Pearson RD, Perry J, Jagger J (2001) Risks to health care workers in developing countries. N Engl J Med 345(7): 538-541.