

Abstract

The point-of-care (POC) devices allow monitoring patient health without the need for bulky instrumentation or a trained medical technicians. This poster focuses on such POC devices and their design concepts.

Introduction

- A POC device is a compact, portable device that enables patient testing at the point of care (e.g., at the bedside or at home).
- It targets specific biomolecules or a biomarker that is a signature for the condition – infectious or chronic
- It allows for better decision-making and improved patient health outcomes.
- It is always easier to use and does not require complex sample preparations following collection. [7]

Novelty of Work

Mobile and real time monitoring of various conditions in a sensitive and highly specific manner that allows early detection. The devices are sophisticated yet easy to use due to application of simple optical technologies. Additionally, these have become very affordable. [8]

Applications

There are single-use (test strips) or multiple-use point-of-care devices that can offer both qualitative and quantitative monitoring of patient health. The data acquisition is done using a variety of analytical techniques such as reflectance, electrochemistry, immunoassays, and electrical impedance measurements. [7]

Some examples of commercial POC devices are; COVID 19 rapid antigen testing, HIV testing, pregnancy testing, blood profiling, cancer testing amongst many others. [6] (See figure 1).

Examples

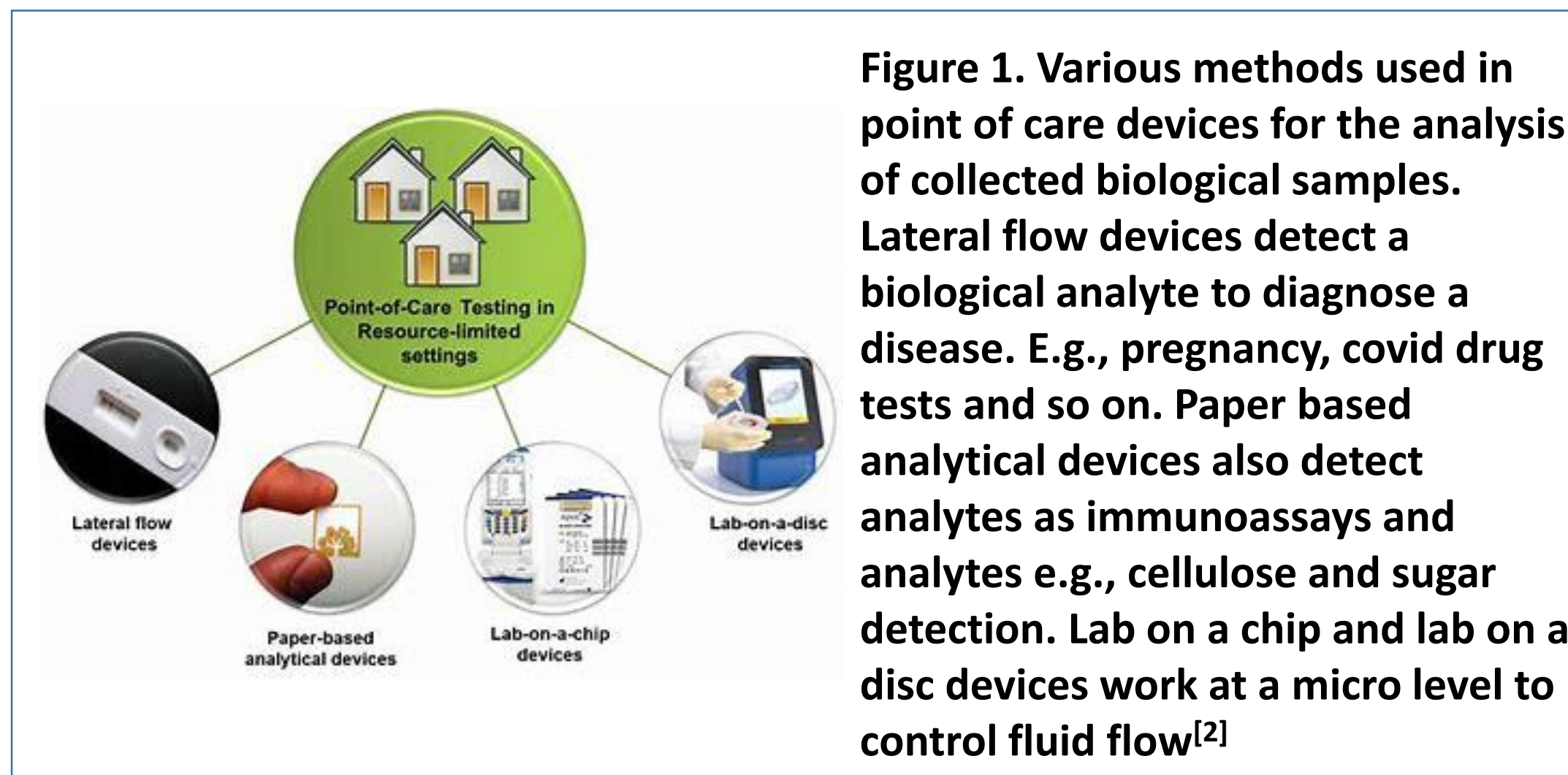


Figure 1. Various methods used in point of care devices for the analysis of collected biological samples. Lateral flow devices detect a biological analyte to diagnose a disease. E.g., pregnancy, covid drug tests and so on. Paper based analytical devices also detect analytes as immunoassays and analytes e.g., cellulose and sugar detection. Lab on a chip and lab on a disc devices work at a micro level to control fluid flow [2]

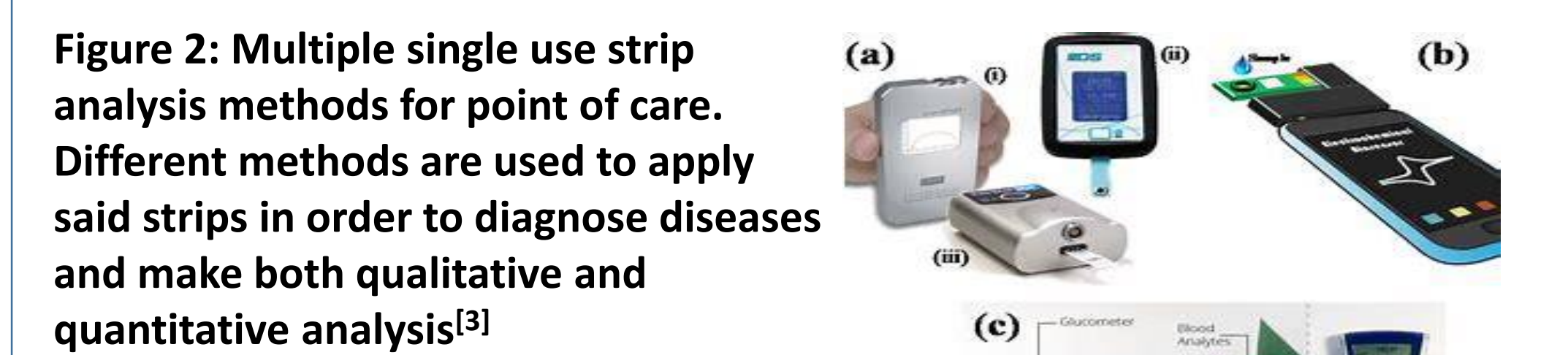


Figure 2: Multiple single use strip analysis methods for point of care. Different methods are used to apply said strips in order to diagnose diseases and make both qualitative and quantitative analysis [3]

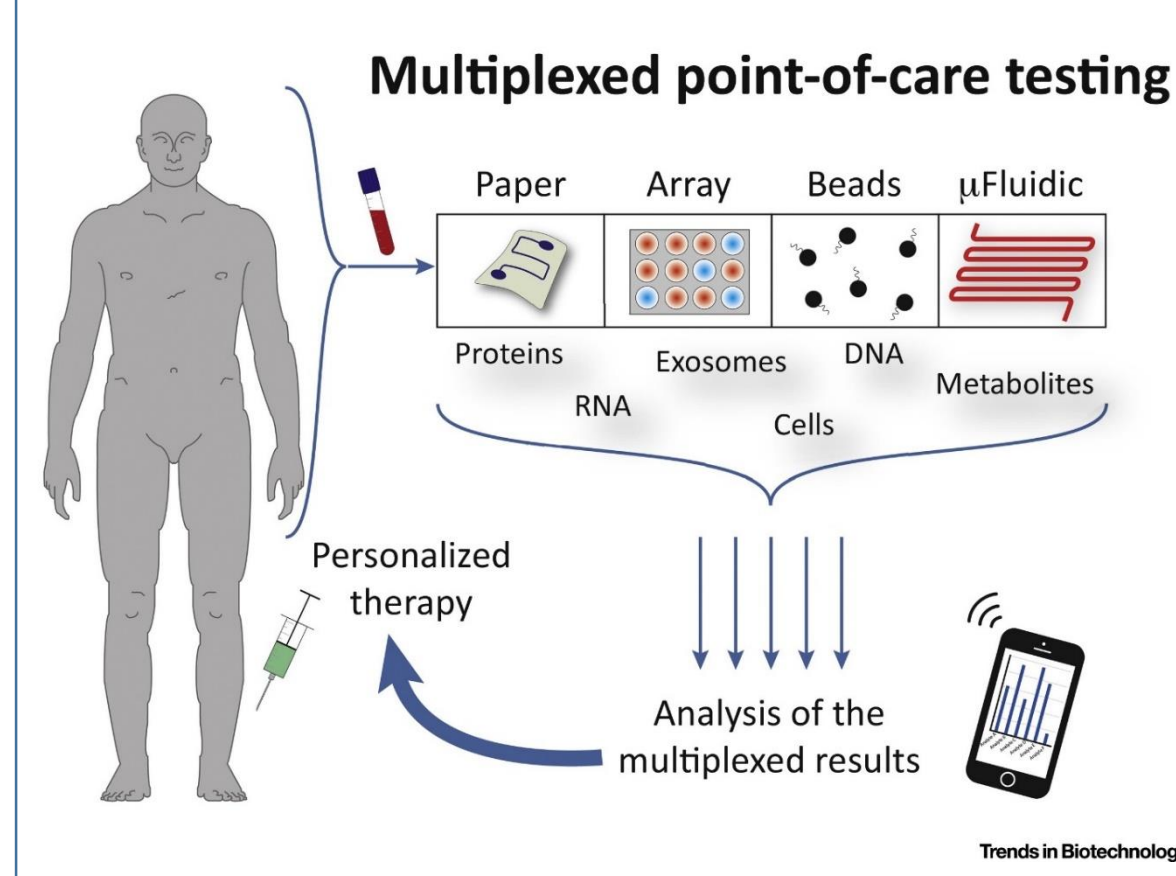


Figure 3. A schematic to show the cycle of use of a POC. From sample collection, to analysis leading to a diagnosis. Said analysis leading to a diagnosis that can aid in personalized medical therapy. [4]

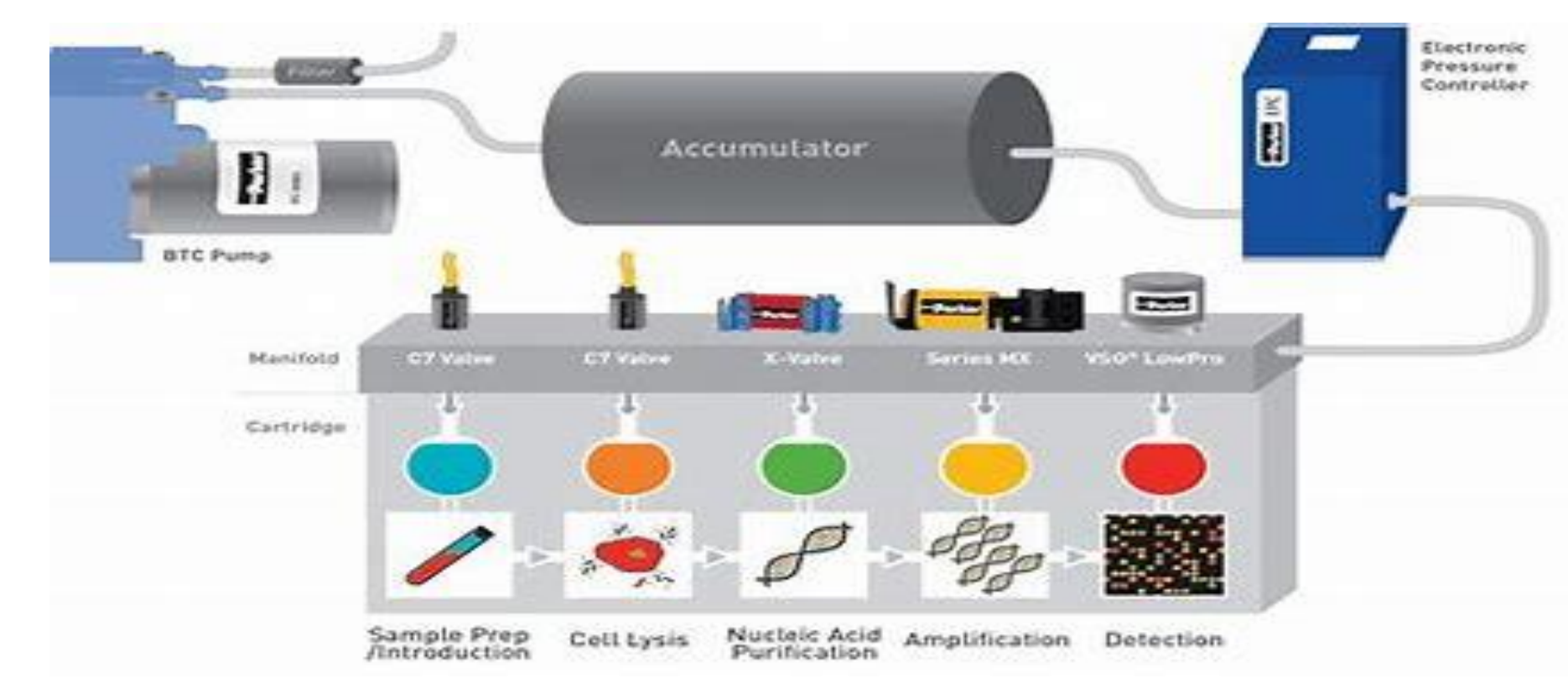


Figure 4. A lab on a chip device showing the process for sample extraction and analysis. [5]

Discussion

- POC devices allow for the use of emergent technology to make quick and accurate medical detections that can lead to time sensitive, life saving decisions. [4]
- These devices have been developed for accurate, real time and sensitive detection of infectious conditions such as, covid 19, HIV and so on.
- There are devices for monitoring routine metabolic indicators such as blood glucose levels (glucometer) as well as white blood cell counts.
- These make a great and affordable alternative for people with financial difficulties.
- There are also wearable electronic devices not featured on this poster.

Conclusion

- Point-of-care devices have a lot of benefits and a lot of drawbacks, but as a matter of opinion the benefits much exceed the drawbacks.
- Point-of-care devices may lower the cost of patient treatment as well as the length of time required for clinical appointments.
- They also enables a speedy response to health changes that may otherwise go missed and prove fatal; in other words, it has a fast turn-around time, which could lead to lower patient morbidity rates. [6]

References

1. Applications of point of care diagnostic devices. Gener8. (2021, October 11). Retrieved April 2, 2022, from <https://www.gener8.net/applications-of-point-of-care-diagnostic-devices/>
2. Figure 1. https://upload.wikimedia.org/wikipedia/commons/4/4b/Multiplexed_point-of-care_testing_%28xPOCT%29.jpg
3. Figure 2. <https://th.bing.com/th/id/R.0a3ce59d14b5fae55f7888ade36d2b937rik=0mKazfKAlVtcag&pid=ImgRaw&r=0>
4. Figure 3. https://th.bing.com/th/id/OIP.9WwLwLx1b_1P6sjuzQXQVHaFz?w=250&h=182&c=7&r=0&o=5&dpr=1.5&pid=1.7
5. Figure 4. https://th.bing.com/th/id/OIP.bxZu_nYsny7PrfngNg0mQAAAA?w=196&h=180&c=7&r=0&o=5&dpr=1.5&pid=1.7
6. Luppia, P. B., Müller, C., Schlichtiger, A., & Schlebusch, H. (2011). Point-of-care testing (POCT): Current techniques and future perspectives. Trends in analytical chemistry : TRAC, 30(6), 887–898. <https://doi.org/10.1016/j.trac.2011.01.019>
7. Pattarkine, L. (2022). Personalized Medicine 2022. PowerPoint Lecture Slides. Retrieved March 26, 2022 from Point Of Care Devices.pptx: BTEC 250-01-2022/Spring - Medical Biotechnologies of 2020 (instructure.com)
8. Point-of-care devices (POC) in the medical industry. (2021, December 10). News. Retrieved April 2, 2022, from [https://www.news-medical.net/whitepaper/20211201/Point-of-care-devices-\(POC\)-in-the-medical-industry.aspx](https://www.news-medical.net/whitepaper/20211201/Point-of-care-devices-(POC)-in-the-medical-industry.aspx)