

# The Future of Autoinjectors

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## INTRODUCTION

- Autoinjectors (AIs) have been in the market since 2006 to support self administration of medication for the treatment of chronic diseases.
- The dominant design has become that of a disposable, spring-triggered device, with manual needle insertion and removal, shield triggered activation and passive needle protection. This design offers good usability and technical simplicity [1].
- However new needs are becoming apparent around improved patient engagement, connectivity, environmental sustainability and the ability to have a flexible device platform that can be leveraged across multiple drug products.

## RESEARCH

To explore these emerging trends, we conducted user and market research to explore what future needs might emerge and whether reusable electronic AIs might better address these.

**User Research:** We conducted an early formative user study (14 participants: 6 injection naïve and 8 experienced disposable AI users).

**Market Research:** We conducted 12 one hour interviews with device experts from 11 leading biopharmaceutical companies to seek their input on market trends, including their interest in platform devices, connectivity, better sustainability and the applicability of reusable electronic devices.

## KEY USER RESEARCH FINDINGS

**Ease of use:** on a scale of 1-10, 10 being the highest ease of use, experienced autoinjector users scored 8.6 for Smart AI compared to 8.7 for their current disposable AI.

**Preference:** 6 of the 8 (6/8) experienced users preferred the Smart AI device over their existing device.

**Connectivity:** 5/8 wanted a connected smart phone app that would support them with medication management with features such as diaries and reminders. All 6 naïve users thought an app would be useful, with smart reminders and the calendar history view most of interest.

The Smart Autoinjector is a great example of the future of autoinjectors. It has a reusable and disposable part, and is small, intuitive and easy to use for patients. It provides a powerful and flexible platform for pharma, reduces waste and is ready for the connected world.

### SINGLE USE DISPOSABLE CASSETTE

- 1 mL & 2.25 mL prefilled syringes with RNS
- Standard subcutaneous delivery
- Full needle safety before/after injection (shield triggered activation and passive needle protection)
- Over 50% less waste and storage space
- Large inspection window
- Optional RFID

### INTELLIGENT, REUSABLE DRIVE UNIT

- Powerful motor to drive controlled injection of liquid drugs (low and high viscosity)
- Full dose delivery in 10 seconds (adjustable)
- Simple sleeve triggered operation
- Intuitive visual/audible User Interface (GUI screen in Advanced version)
- Rechargeable with 3-year service life
- Built-in Bluetooth low energy (BTLE) Connectivity



**Sustainability:** All participants were conscious about sustainability and wanted to reduce waste. On a scale of 1-10 (10 being most environmentally sustainable) the average rating for the Smart AI was 6.2 compared to 2.0 for their current disposable device.

## MARKET AND USER RESEARCH DISCUSSION

- Usability will continue to be a key issue for autoinjectors but the emphasis is shifting to address “want to use” rather than just “can use”.
- A move in the market towards less frequent injections increases the importance of not missing doses. This requires patients to be kept engaged with their medication and also to have the support and confidence to perform injections.

**Electronic reusable autoinjectors are well positioned to serve this need, offering.**

- Enhanced ability to guide the user through the injection with a broader array of visual and audible signals.
- Connectivity to provide reminders and record dosing events, but also enable off-device support services and digitisation of medication events.
- Better control and user perception of the injection process facilitated by an electromechanical drive.
- Growth in injectable biologics and emphasis on self-injection will increase the trend towards device platforms rather than bespoke products, reducing the risk around development and

regulation, improving time to market and managing costs, all being drivers. There is still a need to have some “individuality” and “differentiation” and compact simple formats.

**Platform based electronic reusable autoinjectors can serve this need by:**

- Offering a high degree of flexibility to tailor their performance to needs of a drug or patient – ability to have 1 mL and 2.25 mL in same device platform were seen as important and possible with electromechanical drives.
- By “individualisation /differentiation” in the reusable part rather than the disposable part, economies of scale in the manufacture of the latter can still be gained.
- Continuous improvement in electronic components from a size, cost and robustness ensure future risk reduction, economies of scale and compact offerings for devices.

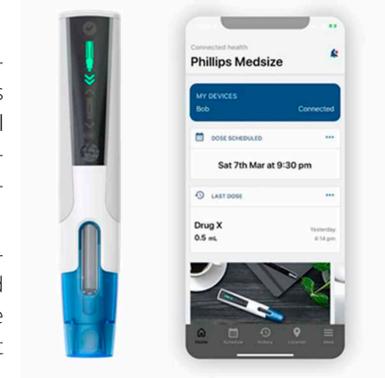
• Sustainability is becoming increasingly important in the minds of both pharma companies and patients [2].

**Electronic autoinjectors can serve this need by:**

- Shifting the more expensive aspects of the device such as the drive and connectivity to the reusable part that can be utilised across multiple injections .
- Reducing the mass and materials used in the cassette
- Taking advantage that connectivity can bring through improved adherence and reduction in the need to travel for healthcare consultations or hospitalisation [2].

## CONCLUSIONS

- As more devices enter the market to support self injection, the benefits around ease of use offered by disposable autoinjectors are becoming “hygiene factors” required by any self-injection device in the market and are therefore no longer differentiators.
- Pharmaceutical companies need to focus on the new emerging needs around less frequent use, sustainability and connectivity and make these a source of competitive advantage.
- We believe electronic reusable autoinjectors are ideally positioned to address current and future needs and we will see their role increase substantially over the next few years.
- Due to potential for such improvements in size, components and costs, they are now well placed to penetrate the disposable market – particularly if developed as a platform offering
- To compete, they will need to offer the same level of safety and usability as current disposable devices. User studies with Smart AI, show this can be achieved.
- They are set to compete with the disposables but with increased competitive advantages addressing the needs of the market from a cost, time to market, sustainability, usability and connected health perspective.



## REFERENCES

- [1] Simpson I. The Future of Autoinjectors, to be published in ONdrugDELIVERY October 2020 <https://www.ondrugdelivery.com/>
- [2] Sørensen B and Fraenkel E. Assessing the Environmental Impact of Autoinjectors , Poster Presentation PDA Universe of Prefilled Syringes 2020
- [3] Digital Adherence Monitoring in Poorly Controlled Paediatric Asthma, Sustainable Healthcare Coalition, <https://shcoalition.org/wp-content/uploads/2019/12/Digital-Adherence-Monitoring-in-Poorly-Controlled-Paediatric-Asthma-Final.pdf>