The Future of Connected Injectable Device Platform

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- Why connected injectable device?
- Challenges associated with device digital connectivity
- Development approaches
- Case Study: digitally connecting auto injector platform
- Future trend and outlook
Why Connected Injectable Devices?

• Improve medication adherence
  – Medication non-adherence still one of the biggest problem

  Extent of Nonadherence Across the Population

For every 100 prescriptions written:  
Filled by the pharmacy 50-70  
Picked up from the pharmacy 48-66  
Taken properly 25-30  
Refilled as prescribed 15-20

At any given time ~50% of patients are non-adherent

– Poor medication adherence costs $100 billion to $300 billion per year in the US alone.
Digitally Connected Device Alone Cannot Solve Medication Non-Adherence

- Medication non-adherence is multifaceted. There are many reasons for poor medication adherence
Connected devices is at the heart of an integrated patient support ecosystem

- Improve medication adherence and patient outcome
- Facilitate more meaningful insight into clinical trial data
- Demonstrate drug efficacy and real world value
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Challenges Associated with Device Digital Connectivity

Challenges:
• Most drug delivery devices are mechanically based with little room for digital integration.

• How to integrate digital connectivity electronics with minimum impact on current platform devices?

• Cost and regulations associated with integrated electronics and power supply within a disposable device.

Today (No Digital Integration)

Future (Seamless Digital Integration)

Digital Add-On Module
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Digital Connectivity Development Approaches

Co-Develop with Device Vendor

3rd Party Developed Solutions

Internal Development
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Case Study: Digitally Connect Auto Injector Platform

• What information do we want to capture? And Why?

• What features do we want to integrate as part of digital integration? Are there digital connectivity solution available that meet or can be easily modified to meet the need?

• Platform consideration
  – Therapeutic Areas
  – Different Auto Injector sizes (1ml & 2.25mL)
  – Ergonomic customization associated with patient populations
Device Assessment

After detailed assessment of the Auto Injector mechanics

- No room for digital integration. Digital integration will significantly increase cost
- Adding sensors and wiring within the auto injector may compromise its functionality
- Adding sensors and wiring may impact final device assembly

**Conclusion:** Will need to develop a digital connectivity add-on module / adaptor
Design Consideration for Add-On Module / Adaptor

- Reusable device
  - Power consumption and power retention
  - Rechargeable or disposable coin cell?

- Ergonomic and aesthetic consideration

- Easily attach on and off the Auto Injector device

- Device use life and reliability

- Functionality and ease of use

- Language considerations

- Visual, Audio, and Tactile cues

**Add-On Module/Adaptor Design Should Be Such that Facilitate Easy Self Injection and Bring Value To the Patient**
Ensuring Robust Detection

• Reusable Add-Ons need to withstand real world conditions

• Build in fail proof design
• Signal processing
• Mechanical design for reliability and manufacturability
• Other
Route of Data Transmission

• Near Field Communication → Smart Phone
  – Short communication range
  – Data transmission limitations
  – Passively powered

• Bluetooth Low Energy → Smart Phone
  – Communication range (~100m)
  – Faster data transmission
  – Actively powered

• GSM / Mobile Network

Auto Injector Image Source: https://www.ypsomed.com
Mobile APP is Part of the Connected Solution

- Device must communicate seamlessly with the accompanying smart phone APP
- Opportunity to convey and capture greater information through the APP
- Serve as the conduit between patient and HCP/clinical sites.
- Electronic diary
- Patient engagement and support capabilities
- etc.
Why connected injectable device?

Challenges associated with device digital connectivity

Development approaches

Case Study: digitally connecting auto injector platform

Future trend and outlook
Future – Short and Long Term

• Is digitally connecting PFS/Safety Device possible?
  • Workhorse for subcutaneous drug delivery
  • Clinical trial and real world medication data
  • 3rd parties such as EverLit Tech are already developing working solutions for PFS/Safety Device
    • Current model: detects if patient self injected or not

• Integrate connectivity consideration as part of new device design

• Integration cost vs. benefit ratio. Environmental stewardship

Source: https://www.everlit-tech.com
Thanks You and Questions