



CONTINUOUS GROWTH & INNOVATION IN COMBINATION PRODUCT MARKET PRESENTS CHALLENGES & OPPORTUNITIES

In the context of the fast-growing biologics market fuelling a rapid rise in the number of patients self-injecting chronic therapies at home, Paul Sullivan, Associate Director of Business Development, Noble, describes market research that underlines the importance of appropriate training and its impact on adherence and compliance, and shows how, amongst available training techniques, smart training devices that are true to the form and function of the actual device, with error-detecting technologies, deliver the most promising results.

The pharmaceutical industry is evolving as more companies are shifting focus from small-molecule drugs to biological medicines requiring drug delivery systems, with more than 60% of recent patent filings from the industry's top ten companies being for biologics.¹

“Device manufacturers and stakeholders, including biopharma companies, healthcare providers, payers and patients, have realised the benefits and importance of training prior to initial self-injections, continuous training and onboarding throughout disease management to counteract administration training decay, and ultimately the role of training and onboarding to help improve adherence and health outcomes.”

It could be said the combination product market is booming with biopharmaceuticals having an annual growth rate of more than 8% – comprising 20% of the pharma market and growing – due to biologics' and biosimilars' ability to treat and manage chronic conditions effectively.² Complementing the growth of the biologics market is the drug delivery device market with the auto-injector being one of the top preferred injectable delivery systems due to the device being self-contained and convenient injection method for the growing number of patients who self-administer medications.

Auto-injectors are expected to continue to remain a preferred delivery device with chronic disease management being a life-long process, and as life expectancy continues to grow. Auto-injectors were designed to improve administration by reducing the complexity of user steps required for injection, taking into account human factors including psychological considerations as well as dexterity and mobility impairments. Other integrations included tactile feedback such as auditory and visual signals indicating the beginning and conclusion of administration.³

While auto-injectors have helped self-injecting patient populations with administering treatment there are still



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challenges as patients continue to make administration errors based upon factors including anxiety and confidence, memory retention and recall, device familiarity, changes in viscosities and volumes requiring longer injection times, and other issues.

These errors and low adherence rates correlate with the emergence of drug delivery training devices. Device manufacturers and stakeholders, including biopharma companies, healthcare providers, payers and patients, have realised the benefits and importance of training prior to initial self-injections, continuous training and onboarding throughout disease management to counteract administration training decay, and ultimately the role of training and onboarding to help improve adherence and health outcomes.

One example of how the growth of combination therapies has an effect on stakeholders can be found with healthcare professionals who receive training on proper administration technique for multiple drug delivery devices. These trainings could include a variety of different devices, and could result in confusion when correctly recalling the operational sequences and functionalities for a particular device. The resulting confusion could be detrimental for a newly diagnosed, device-naïve patient receiving in-office training.

Even if the healthcare professional correctly demonstrates proper administration technique, patients may still not understand how to self-inject. Try putting yourself into a patient's shoes: you have just been diagnosed with a condition, which could be painful or debilitating, and you'll have to manage it by self-injection for the rest of your life. You might be distracted due to possibly being in shock, frightened, sad or be confused due to misunderstanding technical language.⁴ The gravity of the situation may hinder information retention and create a difficult learning and training environment. For the information received, findings suggest 40-80% of medical information provided by healthcare providers to patients is forgotten immediately.⁵

Another example of how the growth of combination therapies has an impact on stakeholders is through continuous industry innovation with formulations and new biologics providing patients with improved therapies and longer periods between injections. While there are many advantages these innovations provide to patients, including normalcy of not being reminded of their condition and added convenience of gaps between self-injection, there are also some disadvantages when it

comes to the patient successfully onboarding and remaining adherent.

The first 30-, 60-, 90-days and beyond (with some treatments self-injected once a quarter) are commonly referred to as onboarding and are the most important times regarding patient adherence. Longer periods between injections could contribute to lower adherence since a patient will most often perform their injections alone outside of healthcare provider supervision (see Figure 1). Factors such as training decay resulting from transience and diminished memory recall of self-administration technique, forgetfulness of treatment dosing schedule, incorrect training due to message erosion and continual patient support could lead to patients receiving sub-optimal treatment, adverse events and even discontinuation of treatment.

Ultimately, patient non-adherence is a major issue that not only affects health outcomes, but costs the healthcare industry billions of dollars each year.⁶ To address stakeholder challenges Noble works closely with biopharmaceutical and original equipment manufacturer (OEM) companies specialising in the design, development and manufacturing of advanced drug delivery systems to develop innovative solutions.

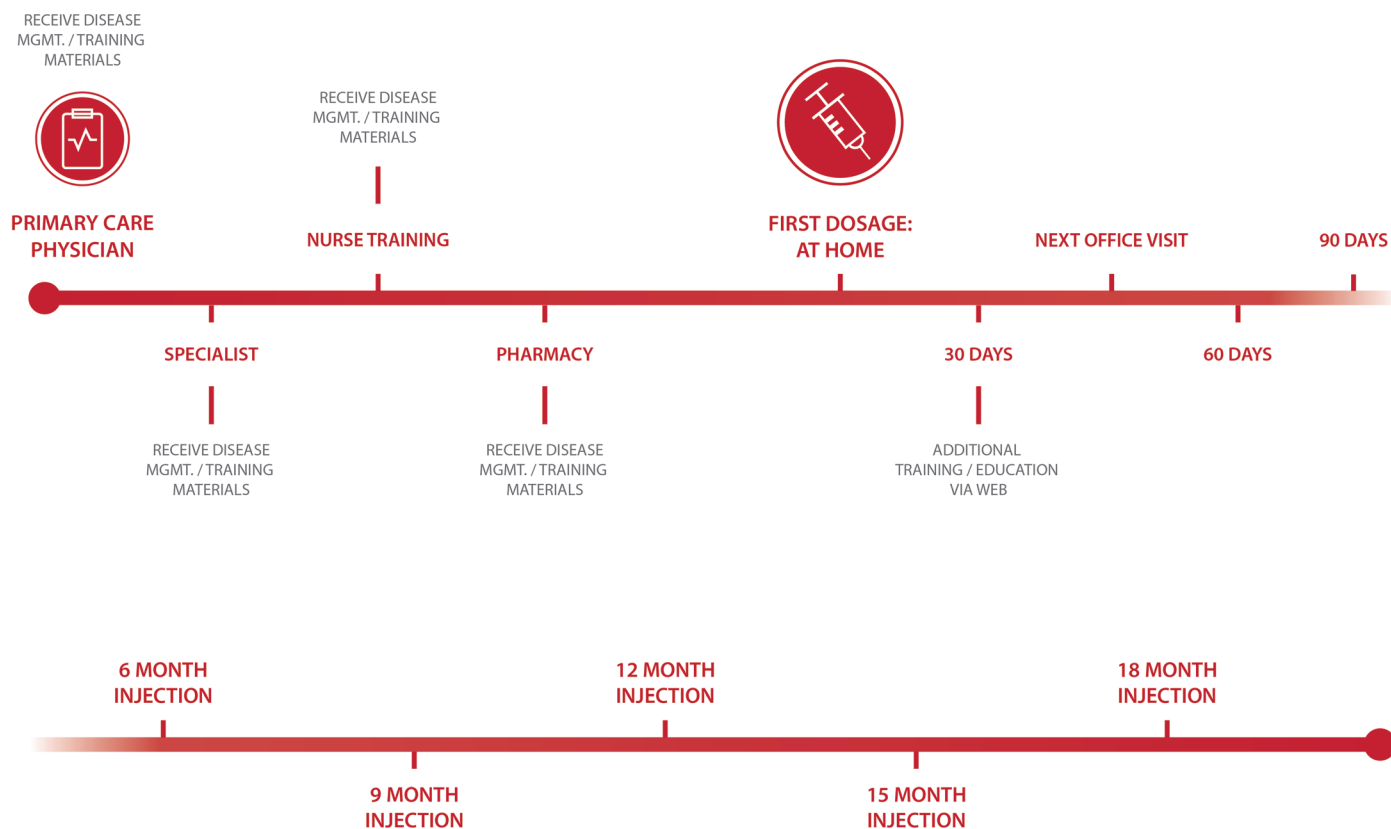


Figure 1: Timeline showing onboarding including initial and subsequent injections at different dosing frequencies.

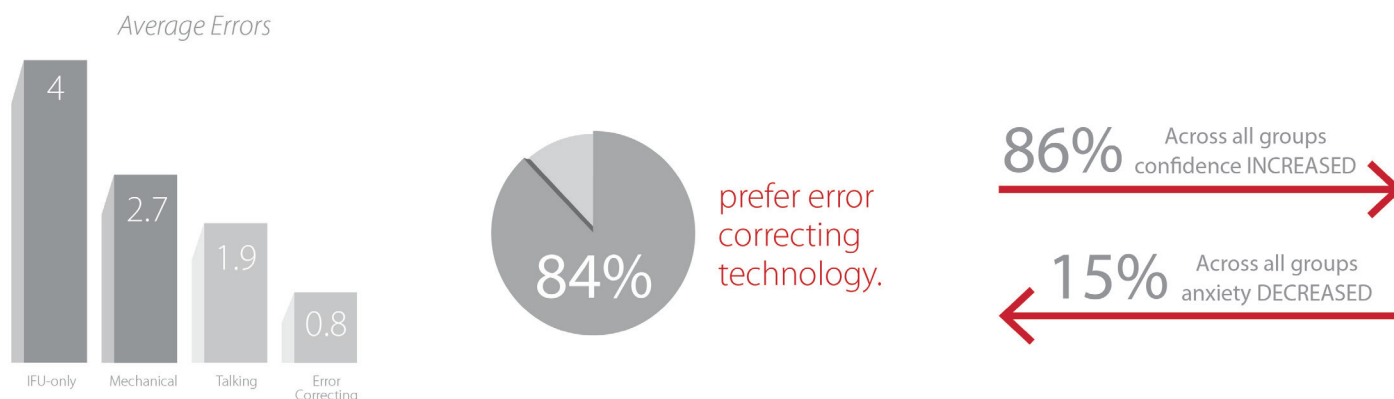


Figure 2: Patient confidence and anxiety are factors impacting compliance and patient adherence and were included as elements of the device preference market study.

Together, Noble and these innovative players are leveraging collaborative research efforts, understanding of human behaviours, and design best practices to carry out a shared mission of offering patients a complete solution of best-in-class molecules, drug delivery devices and training and onboarding programs to assist them with better management of self-administered therapies.

Noble's in-depth market research found that nearly two-thirds of patients do not thoroughly read instructions for use (IFU) documents prior to treatment.⁷ Additionally, 73% of patients report increased anxiety regarding injection therapies when relying on an IFU as their only form of training.⁸ Research also suggests that 45% of patients skip or avoid injections during onboarding due to anxiety or fear.⁹

To counteract some of the cognitive, psychological and emotional factors patients experience, Noble has developed robust patient-centred training and onboarding platforms ranging from mechanical trainers to smart error-correcting devices, training IFUs, quick-tips and more. In doing so, these complete solutions provide value to commercial teams, helping brands strengthen pre-launch, transition and post-launch strategies and maintain positive patient engagement.

Providing patients with a training device that is true to form and function as the actual drug delivery device, means they become familiar with all facets of a device's operation through a simulated injection. Thus, the patient builds confidence, muscle memory and has a reduction in anxiety, thereby minimising risk of engaging in avoidance behaviours.

Just as the combination product industry has been developing innovative products, Noble also continues to

develop improvements to the training and onboarding process for auto-injector and other drug delivery devices.

DEVICE PREFERENCE MARKET STUDY

A device preference market study was conducted to reveal the impact different types of device trainers have on the patient experience. During the study, 55 participants were placed into four groups that received a different combination of training tools and devices to learn a 15-step drug delivery process. Each group was monitored for the number of errors made while practicing the injection treatment with a training tool:

- Group 1 used IFU only for their training and made four errors
- Group 2 used IFU and Mechanical Trainer (tactile and visual feedback only) and made 2.7 errors
- Group 3 used IFU and Talking Trainer (tactile, visual and audio feedback) and made 1.9 errors
- Group 4 used IFU and Error Correcting Trainer (tactile, visual and audio feedback with error correcting technology) and made 0.8 errors.

"These complete solutions provide value to commercial teams, helping brands strengthen pre-launch, transition and post-launch strategies and maintain positive patient engagement."

As stated previously, patient confidence and anxiety are factors impacting compliance and patient adherence and were included as elements of the device preference market study. As shown in Figure 2, based on participant feedback, 84% of users prefer error detection technologies to overcome anxiety when onboarding to device-delivered therapies. Patient anxiety decreased by 15% across all training methods evaluated during this study. Smart training devices with error-detecting technologies are preferred methods in overcoming anxiety and preventing errors.

COLLABORATION PROVIDES PATIENTS BEST-IN-CLASS EXPERIENCE

The biopharmaceutical industry is undergoing a renaissance as many innovative combination products continue to be conceived, refined and brought to fruition to provide patients with better quality of life.

Collaboration has contributed to the growth of combination therapies with companies now forming strategic partnerships by leveraging expertise and finding synergies to develop innovative new drugs. This evolution in the biopharma business model has made it possible for new drugs to go to market faster and at a lower cost creating opportunities for companies to address diseases affecting both large smaller patient populations alike.¹⁰

As part of the sharing of knowledge and resources between biopharma companies to develop an innovative pharmaceutical product there's also the design, development and manufacturing of the drug delivery device. Formulation, device and commercial teams are collaborating earlier in the development process with an emphasis on using a human-centred approach to gather product needs and user needs to ensure the drug and device integration is optimised for performance and user experience.

Similar to innovations in the biopharma industry, training technology is allowing the engineering and capabilities of these devices to continue to advance. These advancements are imperative as they will allow patients to become more confident, overcome treatment barriers, and ultimately lead healthier lives.

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ABOUT THE AUTHOR

Paul Sullivan is Associate Director of Business Development at Noble, a product development company with a focus in designing and manufacturing drug delivery training and patient onboarding solutions. Prior to Noble, Mr Sullivan worked at Informed Medical Communications, as Director of Business Development and Client Service and before that, as a pharmaceutical sales representative with Procter & Gamble. He holds a Kinesiology degree with Honours from the University of Western Ontario, Canada.



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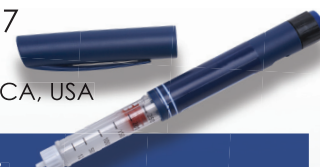
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HIGHLIGHTS IN 2017:

- Explore and harness the **global regulatory ecosystem**; global compliance requirements for product safety and risk analysis
- Assess data bridging and risk based control strategies for combination products
- Map the importance of **Human factors** and **patient centricity** in device design
- Highlight the emerging trends of **connected health** and the future of patient centric drug delivery
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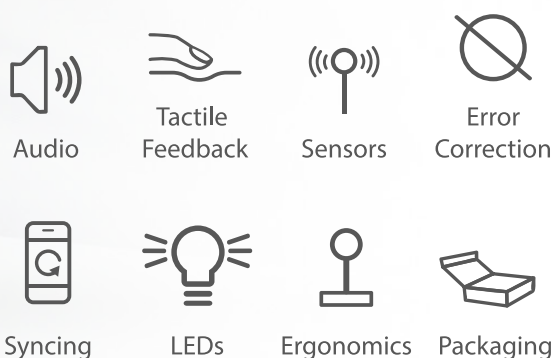


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