

Functionality of a novel follitropin alfa pen injector:

Results from human factor interactions by patients and nurses

Helen Saunders, working at Gedeon Richter/PregLem, a Hungarian/Swiss based biopharmaceutical company, has focused her research on the benefits of a novel Follitropin alfa pen injector known as Bemfola®, which uses follicle-stimulating hormone (FSH), a reproductive hormone for the treatment of infertility in women and men. Bemfola® has numerous benefits that make it an exciting alternative to other more complicated treatment options. Through Helen Saunders and her team's research, they aim to provide women with information related to a simple and cost-effective treatment strategy for infertility.

Infertility is an ever-growing problem that was once shrouded with folklores and superstitions before the advent of modern medicine. Now, breakthroughs in reproductive medicine have given infertile couples from all over the world the opportunity to conceive. A relatively new treatment for infertility promises to provide hope for many women who struggle to remain compliant to current available treatment options. Bemfola®, is a biological medicine and is a replica of the natural follicle-stimulating hormone (FSH) used for the treatment of female and some particular male infertility-related conditions. Bemfola® now comes in a unique and innovative injector pen system. Researchers at Gedeon Richter/PregLem have examined the ease of use and the effect of teaching the improved Bemfola® pen injector may have on patients, nurses and the wider health system.

WHY BEMFOLA®?

Couples who experience infertility are classified as those who have been unable to conceive within 12 months without using any form of contraception. Bemfola® is a treatment that can help couples in cases like this. Bemfola® contains the active ingredient follitropin alfa. It is almost indistinguishable from the naturally occurring reproductive hormone FSH and is produced by means of recombinant DNA technology.

Follitropin is administered to patients to stimulate the development of eggs in the ovaries in women, and sperm in the testes in men. Patients undergoing infertility treatment may use follitropin so that the eggs and sperm can be isolated before undergoing medical procedures such as *in-vitro* fertilisation (IVF) and embryo transfer.

Bemfola® is regarded a biosimilar because its chemical components are biologically similar to a previously licensed drug known as Gonal-f®. They share similar safety and efficacy profiles, but have some differences in the actual format of the injector systems, which in turn result in differences for use and teaching for patients and nurses. Bemfola® is dispensed as a solution in a pre-filled pen and administered via an injection.

The most recent follitropin alfa pen, Bemfola®, has been available since 2014 and this disposable pen provides ease of use compared to other previous self-administered injections. The success of self-administration by patients using the insulin pen for those diagnosed with diabetes, brought about the basis of the design for the Bemfola® injector pen system. The design of the Bemfola® pen achieved the 'Red Dot' Design award in 2011 for its high design quality. Helen Saunders and her team set out to investigate the experience of the use of these pens in patients and nurses to observe their views about the recent improvements of injection systems.

NON-COMPLIANCE

Follitropin alfa has been clinically available as a self-injection in Europe since 1996 and provides patients with a good prognosis. However, non-compliance to hormone treatment has been an issue for patients despite ever increasing chances of treatment success if utilised correctly. Studies have shown that the complexity and physical demands of treatment often impact a patient's ability to stay on the treatment course, resulting in some couples giving up hope of having a child prematurely.

Achieving the right dose of follitropin alfa is important for the accurate



Bemfola® provides a unique opportunity of aiding a greater number of patients with access to infertility care for overall reduced costs with an easy to use injector pen.

development of the eggs and sperm so that they can be isolated as required for IVF and embryo transfer. Small errors in dosing can cause too high or too low levels of follitropin alfa, which reduce the possibility of correct egg and sperm maturation, causing the process of fertility treatment to be a very emotional experience for patients. Studies have shown that anxiety around incorrect dosing causes patients to fear that medication errors will reduce their chance of conceiving and prolong infertility treatment, which also comes with associated costs.

Therefore, providing fertility treatments that can promise ease of use and teaching and in turn avoidance of dosing errors are necessary to ensure patients consistently maintain treatment and improve the chance of conception. Helen Saunders and her team have investigated the improved Bemfola® injection system and assessed patients' and nurses' views to ascertain the human factors associated with Bemfola®.

MAKING IT SIMPLE

Having easy to use injector pens for both healthcare professionals and patients is necessary to provide effective treatment for infertility. Bemfola® comes in five different dose strengths which allows easy fine-tuning of the dosage so that patients are only taking the exact necessary dose for each injection. It comes with clear and easy to follow

steps on how the injector should be used and has volume and injection-control mechanisms. It is a single-use injector pen and must be disposed of once medication is administered. The Bemfola® pen comes with an in-built lock which prevents the pen from being re-used.

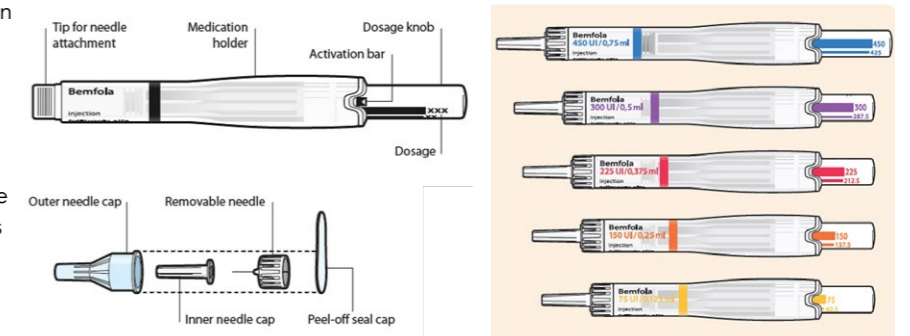
The delivery system of the Bemfola® injection pen provides only a single dosage to be administered, which differs from its competitors and

saves costs by potentially reducing drug wastage.

This was further corroborated with a previous scientific study which also found that Bemfola® was the preferred injection pen, when compared with the Gonal-f and Puregon pens, due to its superior handling, priming and overall use.

Research findings demonstrate that patients have more confidence in using

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Components of the Bemfola® pen.



The research highlighted the importance nurses play in educating patients on how to use the injection pen. Notably, acceptance and confidence in the injector system by health care professionals can impact the success of patient education and therefore compliance.

the injector pen because of its single use. By using only one injection a day and disposing of it, this reduces the complexity of the drug and in turn reduces patient stress. The study also found that the fear of dosage errors was also reduced which in turn reduced the stress that patients were under when it came to correct dosing of fertility treatment.

Helen Saunders and her team's research found that the majority of both patients and nurses described the Bemfola®

injection pens as easy to use, with an average score of 8.0-8.5 out of 10, and so patients felt confident in independently taking the injection at home. Overall,

patients scored an average of 8.7 out of 10 regarding confidence to use the pen alone. Nurses also felt very confident in training patients on how to use the pen injector, with an average score of 9.3 out of 10. The research also highlighted the importance nurses play in educating patients, in this case, on how to use the injection pen. Notably, acceptance and confidence in the injector system by health care professionals can impact the success of patient education and therefore compliance. This research

has helped the team at Gedeon Richter/Preglem improve the documentation and subsequent understanding of the patients and nurses in the use of Bemfola®. The instructions for use of this product contain simple diagrams to the instructions for the Bemfola® injection system alongside easy to understand simple instructions to reduce the chance of errors.

SAVING COSTS

Subsidised financial coverage for fertility treatments often fall short

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and therefore it can be considerably expensive for couples. As many couples pay out-of-pocket costs for treatment across the world, the cost-effectiveness of providing effective fertility treatment is an important consideration. Overall, biosimilars therefore represent a more cost-effective approach for follitropin alfa treatment, whilst maintaining the efficacy of the originator products.

A previous study investigating cost-effectiveness of drugs found that when

compared with Gonal-f and Menopur, Bemfola® outweighed these treatment options because of the cost saving benefits it provides for patients, in turn reducing cost and resulting in less drug wastage.

THE FUTURE OF BEMFOLA®

Numerous studies support Helen Saunders' research, with many patients demonstrating a preference for Bemfola® pens due to its ease of use and training and subsequent handling over the alternatives. Further research

is required to investigate whether the use of these type of single injector pens will translate into an actual increase in treatment compliance and and increase in the chance to conceive for infertile couples.

Bemfola®'s low development costs and the further development of biosimilars who will compete for entry into the market, will reduce the cost of the average price of treatment over time. If current trends prevail, Bemfola® provides a unique opportunity of aiding a greater number of patients access to infertility care for overall reduced costs with an easy to use injector pen.



Behind the Research

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Personal Response

Saunders, H., Bitaine, L., Eftekhari, C., Howles, C., Glaser, J., Hoja, T. & Arriagada, P. (2018). Functionality of a novel follitropin alfa pen injector: Results from human factor interactions by patients and nurses. *Expert Opinion on Drug Delivery*. 15. 10.1080/17425247.2018.1459559

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Research Objectives

Gedeon Richter/Preglem SA is dedicated to the development and commercialisation of innovative drugs for women's reproductive medicine.

Detail

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Bio

Helen is a Medical Affairs Director with a background in medical science/biostatistics and a specialist in infertility/women's health with over 25 years' experience. She has been involved in the running of many different phases and types of clinical trials and in the registration and publication of several products within the infertility setting.

Funding

Gedeon Richter, Preglem S.A.

Personal Response

What do you think will be some of the most exciting developments for injector pen systems and infertility over the next few years?

There is currently an increasing trend in IVF to freeze all embryos in cases of over response and for fertility preservation and in these cases, it is unnecessary to change dose during stimulation, allowing a simpler more convenient treatment for patients. Research is also ongoing using Artificial Intelligence to identify prognostic factors to allow better identification of the required dosing regimens for patients. In all of these situations the Bemfola® pen injector will be well suited given its easy to use and single dose administration which in turn may encourage patients to continue longer with IVF treatment, and reverse current trends where many patients discontinue IVF while further treatment may be successful.

