

**SHORT REPORT**

# Using video-based training for button-free auto-injection of subcutaneous methotrexate: A pilot study

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## 1 | INTRODUCTION

Methotrexate (MTX) is the treatment of choice for immune-mediated joint and skin disorders such as rheumatoid arthritis and psoriatic arthritis (Gossec et al., 2016; Lopez-Olivo et al., 2014; Smolen et al., 2010; Vena, Cassano, & Lannone, 2018). It acts at multiple points in the inflammatory pathway to improve clinical symptoms and disease control, and treatment adherence is essential for the maintenance of this control (Bello, Perkins, Jay, & Efthimiou, 2017). Subcutaneous (SC) administration has contributed substantially to improving adherence to MTX (Scott, Claydon, & Ellis, 2014). When compared with oral dosing, it offers greater clinical efficacy in both early and long-term disease, and a delay in progression to biological therapy (Bello et al., 2017). It also offers more flexible dosing and has greater tolerability, particularly with respect to the gastrointestinal toxicity of oral formulations (Bianchi, Caporali, Todoerti, & Mattana, 2016). The availability of prefilled delivery systems has made the SC injection process even more straightforward, and enhanced the ease and safety of MTX administration (Royal College of Nursing, 2016).

Studies show that self-injection improves patient self-esteem and quality of life, while reducing healthcare costs when compared with nurse-administered injection (Bertheau et al., 2010; Lugaresi et al., 2008). For it to be successful, patients need to be confident in their use of the injection device, possess the manual dexterity for successful operation and be able to overcome any concerns regarding the safe delivery of MTX. Over the last decade, a number of different devices have been developed for self-injection of SC MTX. Studies show that patients with rheumatoid arthritis prefer auto-injector

devices to prefilled syringes, reporting them to be more convenient, easier to use and less painful (Demary et al., 2014; Pachon, Kivitz, Heuer, & Pichlmeier, 2014; Sarau, Hudry, Zinovieva, & SELF-I Investigators group, 2019; Thakur, Biberger, Handrich, & Farouk Rezk, 2016).

However, the use of auto-injection devices is not without its issues. Devices vary in terms of ease and mode of use, and one-to-one instruction to ensure safe and effective administration and disposal can take up valuable time in the rheumatology clinic (Homer, Nightingale, & Jobanputra, 2009). Local contract variations and pharmacy stock issues can expose patients to changes in device prescribing and availability, and require nurses to train patients in more than one auto-injection device. The increasing availability of biological disease-modifying antirheumatic drugs (bDMARDs) delivered by SC injection adds to this burden. In our practice, we use FP10 prescribing (i.e., prescriptions that are routinely issued in primary care by a general practitioner or nonmedical prescriber), and the local community pharmacist orders in the device. As a result, we can manage the devices being used, and the patients avoid any overstock issues.

New and experienced injectors alike are likely to require MTX SC self-injection training. One of the ways to address the issue of nurse resource and associated healthcare costs is to look at the use of devices that can simplify the auto-injection process and reduce the amount of training time required. The present pilot study looked at whether patients could be instructed to use a MTX prefilled, button-free, auto-injector pen with a double-click mechanism for SC injection (NORDIMET<sup>®</sup>, Nordic Group BV, The Netherlands) via video training instead of nurse demonstration. It also looked at whether this mode of training affected patient confidence in self-injection and satisfaction with the device. A secondary objective of the study was to assess

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**Nordimet® Patient Questionnaire**

**Patient information**

1. Please indicate your age bracket:

Under 18                       50-59  
 18-29                         60-69  
 30-39                         70-79  
 40-49                         80+

2. Please indicate your gender:

Male                                
 Female                             
 Prefer not to answer            Not listed. Please indicate: \_\_\_\_\_

3. Please indicate your ethnicity  
Guidance note: These categories are based on 2011 census categories for England

White                               Mixed or multiple ethnic groups  
 Asian/Asian British            Other. Please indicate: \_\_\_\_\_  
 Black/African/Caribbean/Black British

4. What is your main language (the language spoken most proficiently)?

English  
 Other. Please indicate: \_\_\_\_\_

5. Do you require an interpreter at clinic visits?

Yes                                 No

6. Which condition have you been prescribed methotrexate for?

Rheumatoid arthritis (RA)                       Severe psoriatic arthritis  
 Polyarthritic forms of severe, active juvenile idiopathic arthritis                       Other. Please indicate: \_\_\_\_\_  
 Severe recalcitrant disabling psoriasis

7. How long ago were you diagnosed with the condition selected in question 6?

<1 year                               10-20 years  
 1-5 years                               20-30 years  
 5-10 years                               30+ years

8. How is your methotrexate injection most often administered?

I inject myself                               A carer gives me the injection  
 A nurse gives me the injection

9. Before being prescribed Nordimet®, which type of device were you using to inject methotrexate?

A pre-filled button-activated pen                       Other: \_\_\_\_\_  
 A pre-filled syringe

10. Before being prescribed Nordimet®, how long had you been using the specific device indicated in question 9 to administer methotrexate?

<1 year                               10-20 years  
 1-5 years                               20+ years  
 5-10 years

**Training process**

11. How did you choose to be trained on Nordimet® administration?

Appointment with a rheumatology nurse specialist                       Other. Please indicate: \_\_\_\_\_  
 Use of the Nordimet® training video on the patient website

If you received training via the Nordimet® Training video please answer question 12 then progress straight to question 13. If you chose to receive training via a rheumatology nurse specialist please progress straight to question 13.

12. When thinking about your training on administering Nordimet®, how much do you (or does your carer) agree with the following statements?  
 Please circle your response

	1	2	3	4	5
	strongly disagree	hard to disagree	neither	hard to agree	strongly agree

13. Since being prescribed Nordimet®, how many times have you used the injection device to administer methotrexate?

0                                       1-3                                       4-6                                       7+

14. Overall, how satisfied are you with Nordimet® to administer methotrexate?  
 Please circle your response

1	2	3	4	5
Very Dissatisfied	Dissatisfied	Neither Dissatisfied nor Satisfied	Satisfied	Very Satisfied

15. When thinking about Nordimet® compared to your previous device, are you more satisfied, equally satisfied or less satisfied regarding the following criteria.

Please tick the box that applies for each	More satisfied with Nordimet	Equally satisfied	Less satisfied with Nordimet
Operation of the device (i.e. ease of injecting)			
Experience of injection			
Comfort in hand			
Use with dexterity issues or during flare-ups			
Confidence in full dose being given			
Convenience of storage and disposal			
Portability (i.e. ease of transport between places)			

16. Are you still using Nordimet®?  
 Yes                                       No  
 If not, please provide details of why not: \_\_\_\_\_

17. Please describe whether you experienced any difficulties when injecting with Nordimet®?  
 Yes                                       No  
 If you experienced difficulties, please provide details: \_\_\_\_\_

18. Please use this space to provide any further comments:  
 \_\_\_\_\_

19. \_\_\_\_\_

**FIGURE 1** Questionnaire (18 items) designed to evaluate patient experience of using the button-free auto-injector, and to be completed by the author during a 10-min telephone interview with each individual patient

levels of satisfaction with the button-free device across a number of different criteria and compare it with the patient's previous device.

**2 | METHODS**

All patients with a clinical diagnosis of rheumatoid arthritis or psoriatic arthritis (or other inflammatory condition) for which they were currently administering SC MTX using a button-activated pen device (n = 33) were invited to change to a button-free, auto-injector by letter. Those choosing to switch were given the choice of self-training using a 2-min online video (Nordic Pharma UK Ltd, 2019) or receiving standard one-to-one instruction from a rheumatology nurse in the clinic.

Patients were contacted approximately 4 weeks after the switch and invited to participate in a 10-min telephone questionnaire (18 items) designed to evaluate their experience of using the button-free auto-injector. The questionnaire (see Figure 1) was developed by the author, with the assistance of a medical writer. Each questionnaire was completed by the author using responses gathered via a prebooked telephone interview with individual patients. Initial questions gathered information on disease status, time since diagnosis and use of MTX. Further questions asked about patient experience according to three outcomes: patient confidence and ability to use the auto-injector; the impact of self-instruction via video on satisfaction with use; and comparative satisfaction across button-free and button-activated auto-injection devices. Satisfaction with the device was assessed overall and according to seven specific auto-injector attributes: ease of injection; experience of injection; comfort in hand; use with dexterity issues or during flare-ups; confidence in full dose being given; convenience of storage and disposal; and portability. All follow-

up telephone interviews were carried out by the same rheumatology nurse working within the Community Rheumatology Service based at Enki Medical Practice (Handsworth, Birmingham, UK).

Ethics approval was not required for this pilot study as it was conducted in accordance with the Clinical Commissioning Group<sup>1</sup> protocol for primary care wholesale switching, as part of its role to fund and monitor the provision of care and work with clinicians to optimize medicines management and reduce drug spend. As part of the protocol, patients were invited by letter to make the switch, and they then self-referred to make the switch to the button-free auto-injector. This was accepted as consent.

**3 | RESULTS**

Thirty-three patients were invited to change to the button-free auto-injector. Twenty-two (67%) patients responded initially, and 19 completed the study (three patients failed to complete the questionnaire).

**3.1 | Choice of instruction when switching devices**

Of the 19 who completed the study, 14 (73.7%) chose to self-train and five (26.3%) chose an appointment with their rheumatology nurse. Of those patients choosing to self-train, 11 used the video and three were confident to proceed without any instruction, based on their use of similar devices or willingness to use printed support materials.

<sup>1</sup>Clinical Commissioning Groups (CCGs) are clinically led statutory NHS bodies responsible for the planning and commissioning of health care services for their local area.

**TABLE 1** Patient characteristics

	<u>Video training</u>	<u>Nurse appt.</u>	<u>No training</u>	<u>All</u>
	<u>n (%)</u>	<u>n (%)</u>	<u>n (%)</u>	<u>n (%)</u>
Gender				
Female	1 (9.1)	1 (20.0)	2 (66.7)	16 (84.2)
Male	10 (90.9)	4 (80.0)	1 (33.3)	3 (15.8)
Age (years)				
<60	8 (72.2)	2 (40.0)	2 (66.7)	12 (63.2)
≥60	3 (27.3)	3 (60.0)	1 (33.3)	7 (36.8)
Main language				
English	9 (81.8)	5 (100.0)	3 (100.0)	17 (89.5)
Other	2 (18.2)	0	0	2 (10.5)
Diagnosis				
Rheumatoid arthritis	8 (72.2)	4 (80.0)	2 (66.7)	14 (73.7)
Psoriatic arthritis	2 (18.2)	0	1 (33.3)	3 (15.8)
Systemic lupus erythematosus	1 (9.1)	0	0	1 (5.3)
Scleroderma	0	1 (20.0)		1 (5.3)
Time since diagnosis (years)				
1–5	4 (36.4)	3 (60.0)	2 (66.7)	9 (42.4)
6–10	4 (36.4)	0	1 (33.3)	5 (26.3)
>10	3 (27.3)	2 (40.0)	0	5 (26.3)
Duration of use of device (years)				
<1 year	2 (18.2)	2 (40.0)	1 (33.3)	5 (26.3)
1–5 years	8 (72.2)	1 (20.0)	2 (66.7)	11 (57.9)
>5 years	1 (9.1)	2 (40.0)	0	3 (15.8)
Who injects				
Self-injection	9 (81.8)	3 (60.0)	3 (100.0)	15 (78.9)
Nurse/carer	2 (18.2)	2 (40.0)	0	4 (21.1)
Still using new device				
Yes	10 (90.9)	3 (60.0)	3 (100.0)	16 (84.2)
No	1 (9.1)	2 (40.0)	0	3 (15.8)

### 3.2 | Patient profile

The profile of the study participants choosing to switch devices is summarized in Table 1. The majority were female, aged under 60 years, with English as their main language. The majority had rheumatoid arthritis and had been diagnosed within the last 10 years. Most had been self-injecting MTX with an auto-injection device for at least 5 years. There were no discernible differences regarding demographics, disease profile or device use when comparing those patients who chose to self-train via video with those who asked for a nurse visit.

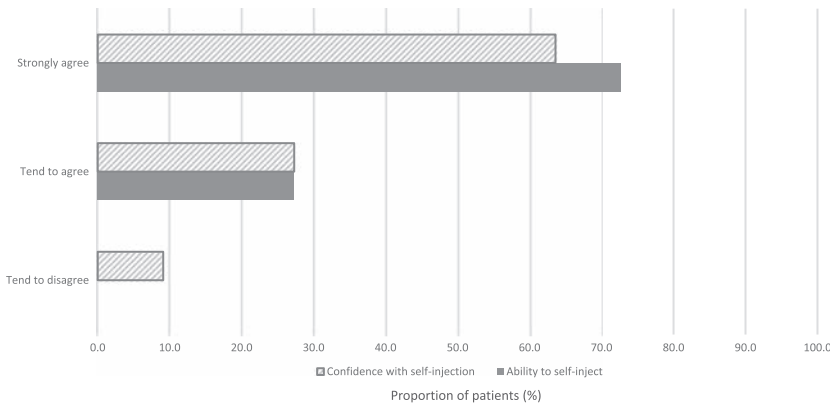
### 3.3 | Patient confidence and ability to use the button-free auto-injector

Of those patients choosing to self-train ( $n = 11$ ), 100% tended to agree or strongly agreed that the self-training video provided

sufficient instruction on how to use the button-free auto-injector; 91% ( $n = 10$ ) tended to agree or strongly agreed that they were confident that they could perform self-injection correctly, without help, after watching the video (see Figure 2). Only one patient opting to self-train indicated they would have preferred to receive nurse instruction.

### 3.4 | Satisfaction with the button-free auto-injector

Approximately 80% ( $n = 15$ ) of patients overall were satisfied or very satisfied with administering MTX using the button-free auto-injector. Although numbers were small, self-training did not appear to reduce satisfaction with the device: 84.6% of those patients stating that the video was all they needed for instruction and 83.3% of those who were confident in their ability to perform self-injection correctly after viewing the video were satisfied or very satisfied with the device. Three patients discontinued the button-free device: one switched to



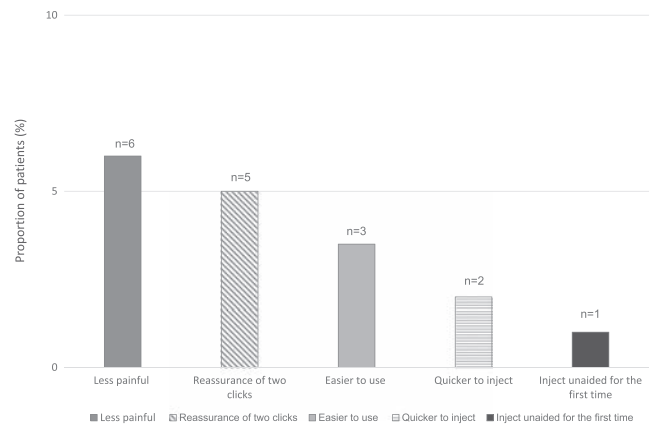
**FIGURE 2** Level of agreement with (a) “The website and video were all I needed to instruct me on how to self-inject using the new device”, and (b) “I felt confident I could self-inject correctly after watching the video” (n = 11)

oral therapy for reasons unrelated to the device, and two returned to their original device.

The majority of patients switching (85%) were equally or more satisfied with the use of the button-free auto-injector pen compared with their previous device. When looking at specific attributes, patients were equally or more satisfied with the button-free auto-injector when compared with their previous device across all seven criteria (see Figure 3). Comfort in hand, confidence in full dose being given and ease of injection were all attributes prompting greater satisfaction when compared with their previous device in more than 50% of patients. At the postswitch follow-up, 13 patients provided additional comments on the button-free auto-injector that were not covered specifically by the questionnaire (see Figure 4). One patient declared that she was able to self-inject unaided for the first time.

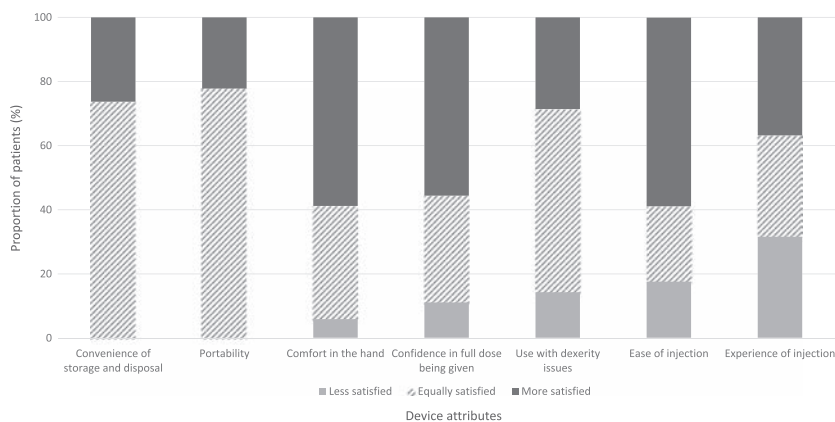
#### 4 | DISCUSSION

The present pilot study is the first to show the potential for patient-driven use of instructional videos to facilitate self-training in the use of an MTX button-free auto-injector device without having a negative impact on the ability to self-inject, confidence in administration or satisfaction with use. More than 80% of those patients who were confident in their ability to perform self-injection correctly after viewing the video were satisfied or very satisfied with the button-free auto-injector device.



**FIGURE 4** Unprompted features of button-free auto-injector device (n = 13; some patients described more than one attribute of the new device)

These findings have implications for the future training of patients in the use of auto-injection devices for SC MTX. Education regarding the self-injection of MTX is important in promoting the understanding of the risk and benefits of therapy. Some patients may also experience anxiety around self-injection, and express concerns around spillage, pain or fear of needles (Saraux et al., 2019). Initial nurse training is therefore essential in providing reassurance. A video is a useful option for instruction in the use of a device, freeing up valuable clinical time that could then be used for the training of patients new to SC MTX.



**FIGURE 3** Comparative satisfaction with new vs. previous auto-injector across seven device attributes (n = 19)

The use of video training for self-injection is not a new concept but there are few studies assessing its impact and value for SC MTX. A study by Katz and Leung (2015) compared standard nurse-led MTX self-injection education with a 12-min web-based video plus standard teaching on patient confidence with self-injection, patient satisfaction, and knowledge and teaching time. There was no impact on satisfaction with MTX self-injection, and a trend towards a greater knowledge of the procedure.

In the study described here, assuming that all patients would have attended one visit for initial training on self-injection of SC MTX, use of the self-training video reduced the number of nurse visits required in patients familiar with self-injection by 50%, freeing up valuable nurse time. In reality, we estimate there to be an average of 1.5 follow-up visits per switch in our community rheumatology service, as some patients require one visit and others require two, following a change of device. Eleven patients choosing to self-train by video, therefore, creates the potential to save 16.5 nurse visits. If each visit is equivalent to 20 min of nursing time, at a cost of £78 (representing 70% of the national tariff [NHS Improvement, 2019]), there is a potential saving of approximately £1,287. Our study did not quantify the savings in nursing time or costs; these are purely estimates of the potential impact. However, a similar positive effect on nursing time was demonstrated in a study by Saraux et al. (2019). In a comparison of the same button-free auto-injector with a prefilled syringe, the authors reported that the proportion of injections involving healthcare professionals was threefold lower than in the group using the prefilled syringe. In the study by Katz and Leung (2015) described above, use of the video reduced the amount of nurse teaching time by approximately 25%. In this study, one patient regretted their choice of self-training via video, expressing a later preference for a nurse. By contrast, three patients were confident to proceed with using the button-free auto-injector with neither the self-training video nor nurse instruction. Factors that both increase and decrease patient confidence in the use of an alternative device would be useful to explore in further studies.

Three studies have looked at the patient acceptability, usability and satisfaction of auto-injection devices for self-injection of MTX when compared with prefilled syringes (Demary et al., 2014; Hudry et al., 2017; Saraux et al., 2019). Both Demary et al. (2014) and Saraux et al. (2019) showed a patient preference for the auto-injector with regard to user acceptability and satisfaction. The present study took the evaluation one stage further, by comparing satisfaction with use of button-free and button-activated devices across different attributes. Satisfaction with the button-free auto-injector was high in general and, for the majority of patients, equal or greater when compared with their previous device.

The present study was a single-centre pilot, designed to test the impact of video training on confidence and ability to self-inject MTX when switching to a different device. All postswitch interviews were conducted by the same rheumatology nurse (D.H.), reducing the possibility of interviewer bias, and the detailed questionnaire gathered useful insights that could be used further to develop tools to evaluate the impact of different interventions on nursing time. As with all

studies involving questionnaires, the possibility of self-selection bias is a limitation. Single-centre recruitment limits the utility of results across different patient populations, and the lack of data regarding previous auto-injection devices limits comparability with other studies. Moving forward, the inclusion of additional centres and more quantitative assessment of the impact on nursing time will prove useful in generating data about potential cost savings when training patients in the use of MTX self-injection. This information may prove useful when looking at opportunities to streamline device use across MTX and bDMARDs, and may prove to be of interest in many areas of healthcare provision, including pharmacy.

## 5 | CONCLUSION

This pilot study is the first to show the potential for patient-driven use of instructional videos to facilitate self-training in the use of an MTX button-free auto-injector device without having a negative impact on confidence in administration or satisfaction with use. The benefits of patient choice and nurse resource allocation should, therefore, be considered when making wholesale switches to alternative devices for delivery of the same medication.

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## CONFLICTS OF INTEREST

The author has worked as a consultant for Bristol Myers Squibb, Janssen-Cilag and Lilly.

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