Assessing the utility of the decoy effect on biologic treatment preference

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Abstract

Background: Many patients struggle with choosing and adhering to biologics. Psychological approaches (e.g. decoy effect) may impact patients' choices when selecting a biologic.

Objective: Assess whether decoy options influence choice between injectable treatment options.

Methods: Following IRB approval, 750 subjects >18 years were recruited through MTurk. Subjects were randomized in a 1:1:1 ratio into the following groups: 1) baseline comparison between a more effective, weekly injection and a less effective, every-three-month injection; 2) baseline with a decoy inferior to the weekly injection; 3) baseline with a decoy inferior to the every-three-month injection. Treatment preference was self-reported and compared using chi-square tests.

Results: Sixty-six percent of subjects preferred the weekly injection versus 34% for the every-three-month injection (group 1). There was a 4% increase in the number of subjects who preferred the weekly injection (70%; group 2; P=0.34) and a 3% increase for the every-three-month injection (37%) when a decoy inferior to them was included (group 3; P=0.56).

Conclusion: Psychological approaches can be used to enhance treatment initiation and adherence. However, the decoy effect did not appear to have a significant impact in this study. Patients' preferences for efficacy versus frequency of injection may be rather fixed.

Keywords: adherence, biologic, treatment, psoriasis, medication, adverse effect

Introduction

Biologics have revolutionized dermatology, but it can be difficult for patients to choose among them. Psychological approaches, such as the decoy effect, may enhance the selection and initiation of medications by patients. The decoy effect is a psychological phenomenon in which the addition of a third inferior option to two other choices of equal appeal deviates preference towards one of the original two options [1]. For example, people may find it difficult to choose between a larger apple versus a sweeter orange. Adding a third option that is clearly inferior on all dimensions to one of the first two options, such as a smaller apple that is still larger than the orange, can help influence people to prefer the option that is clearly superior to the decoy (i.e. the larger apple).

The decoy effect has been replicated in a wide variety of situations involving commercial products, jobs, and political candidates [2-4]. This psychological phenomenon may help enhance biologic treatment initiation and adherence among patients. Efficacy versus frequency of injections may influence patients' decisions to use a biologic. For example, it may be difficult to choose between a more effective injection given weekly and a less effective injection given once every three months, as patients may prefer higher efficacy and less frequent injections [5]. If a decoy choice is added that is clearly inferior to one of the options—e.g. a less effective injection given weekly that is still more effective than

the injection given once every three months—there can be a shift in preference toward the original option that is clearly superior to the decoy (i.e. the more effective injection given weekly). In this study, we assessed whether a decoy option influences choice between injectable treatment options.

Methods

Following IRB approval, 750 subjects >18 years were recruited through MTurk (an online platform extensively used by psychologists for subject recruitment). Subjects were randomized in a 1:1:1 ratio into the following groups: 1) baseline comparison between a more effective, weekly injection and a less effective every-three-month injection; 2) baseline with a decoy inferior to the weekly injection; and 3) baseline with a decoy inferior to the every-three-month injection (**Table 1**). Demographic information—age, gender, race/ethnicity, dermatological condition—was also collected. Treatment preference was compared using chi-square tests. For N=750, we had 80% power to detect an effect size of 0.12. P values <0.05 were considered statistically significant.

Results

There were no statistically significant differences between the three groups' baseline demographic characteristics (**Table 2**). When presented with a weekly injection and every-three-month injection, 66% of subjects preferred the more effective weekly injection versus 34% for the less effective every-three-month injection (group 1). There was a 4% increase in the number of subjects who preferred the weekly injection (70%) when a decoy inferior to it was included (group 2; P=0.34) and a 3% increase for the every-three-month injection (37%) when a decoy inferior to it was included (group 3; P=0.56).

Discussion

Biologics are often recommended for those with severe or difficult-to-control psoriasis. Serious comorbidities can occur in those with psoriasis and an unwillingness to take biologics could lead to health problems that are much worse than just the skin disease. Utilizing psychological techniques to assist patients in choosing biologics might help prevent such outcomes. However, the decoy effect did not have a significant effect on patient preference for efficacy versus frequency of injection.

Table 1. *Survey questions for the presentation of the different treatment options.*

Group 1 (baseline): Which medication would you prefer to take: A or B?

Option	Frequency	Type	Likelihood of complete skin clearance
A	Once a week	Injection	90%
B	Once every 3 months	Injection	70%

Group 2 (decoy inferior to the weekly injection): Which medication would you prefer to take: A, B, or C?

Option	Frequency	Type	Likelihood of complete skin clearance
A	Once a week	Injection	90%
B	Once every 3 months	Injection	70%
C	Once a week	Injection	80%

Group 3 (decoy inferior to the three-month injection): Which medication would you prefer to take: A, B, or C?

Option	Frequency	Type	Likelihood of complete skin clearance
A	Once a week	Injection	90%
B	Once every 3 months	Injection	70%
C	Once every 3 months	Injection	50%

Table 2. *Summary of baseline characteristics and demographic information.*

Variable	Group 1 (*n*=254)[a]	Group 2 (*n*=251)[b]	Group 3 (*n*=245)[c]
Subject			
Age[e] (y)	34.8 ± 10.2	34.8 ± 10.7	35.8 ± 10.5
Male sex (%)	160 (63%)	147 (59%)	139 (57%)
Female sex (%)	94 (37%)	104 (41%)	106 (43%)
Ethnicity (%)			
White	139 (55%)	148 (59%)	143 (58%)
Asian or Pacific Islander	75 (30%)	70 (28%)	60 (24%)
Hispanic or Latino	22 (9%)	8 (3%)	18 (7%)
Black	8 (3%)	16 (6%)	13 (5%)
Native American	4 (2%)	4 (2%)	4 (2%)
Other	6 (2%)	5 (2%)	7 (3%)
Dermatological condition			
Acne	128 (40%)	120 (41%)	117 (41%)
Psoriasis	74 (23%)	59 (20%)	58 (20%)
Eczema	52 (16%)	62 (21%)	52 (18%)
Rosacea	29 (9%)	24 (8%)	21 (7%)
Melanoma	20 (6%)	15 (5%)	15 (5%)
Basal cell carcinoma	6 (2%)	3 (1%)	6 (2%)
Squamous cell carcinoma	4 (1%)	3 (1%)	3 (1%)
Other	7 (2%)	9 (3%)	13 (5%)
Treatment preference			
Weekly injection	167 (66%)	175 (70%)	137 (56%)
Every three-month injection	87 (34%)	49 (20%)	90 (37%)
Weekly injection (decoy)	-	27 (11%)	-
Every three-month injection (decoy)	-	-	18 (7%)

[a]Group 1 = baseline comparison between a weekly injection and every three-month injection.
[b]Group 2 = baseline with a decoy inferior to the weekly injection.
[c]Group 3 = baseline with a decoy inferior to the every three-month injection.
[d]Values are represented in mean ± standard deviation.

Although the decoy effect has proven effective in a variety of settings, this psychological phenomenon may not translate well into a setting in which people have relatively fixed preferences. For example, some patients may prefer a more efficacious injection, regardless of the frequency of injection. On the other hand, some patients may prefer a lower injection frequency, even if the injection is less efficacious than other options. Under these circumstances, the addition of a decoy option may not shift patients' preferences toward a specific target option.

This study has limitations. Subject-reported preferences may not correlate with actual medication choices. Participants were not required to have a particular dermatological condition to participate. For those with a dermatological condition, disease severity and current treatment regimens were not reported. Some responders may not have paid close attention, as evident by choosing decoy options designed to be thoroughly inferior to one of the other choices.

Conclusion

Although the decoy effect was associated with a small trend in the expected direction, the results were not statistically significant. Patients' preferences for efficacy versus frequency of injection may be rather fixed. Although psychological approaches can be used to influence patients' treatment preferences, the decoy effect did not appear to have a significant impact on preference in this study.

Potential conflicts of interest

S.R.F. has received research, speaking and/or consulting support from a variety of companies including Galderma, GSK/Stiefel, Almirall, Leo Pharma, Baxter, Boeringer Ingelheim, Mylan, Celgene, Pfizer, Valeant, Taro, Abbvie, Cosmederm, Anacor, Astellas, Janssen, Lilly, Merck, Merz, Novartis, Regeneron, Sanofi, Novan, Parion, Qurient, National Biological Corporation, Caremark, Advance Medical, Sun Pharma, Suncare Research, Informa, UpToDate and National Psoriasis Foundation. He is founder and majority owner of www.DrScore.com and founder and part owner of Causa Research, a company dedicated to enhancing patients' adherence to treatment. The remaining authors declare no conflicts.

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