

A study for patients receiving ureteroscopic surgery with double-J stents indwelled using chatbot for improving patient education



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Abstract

Health education is important for improving patients’ treatment adherence, thereby reducing morbidity. Face-to-face communication is insufficient nowadays, and online interaction can improve patient–physician communication and education. We designed a free interactive counseling program in a mobile communication application for patients receiving indwelling double-J ureteric stents (DJs) after ureterorenoscopic lithotripsy (URSL) and evaluated satisfaction with the program and its influence on patients’ subjective experience of DJ-related symptoms.

Introduction

Face-to-face communication is currently the primary modality for patient education. However, physicians might have time constraints in communicating and providing necessary information and instructions. A mobile application, directed specifically at the actual disease, might have a positive effect on reminding patients’ about instructions and using given information.

A double-J ureteric stent (DJ) is a medical device used to prevent or treat obstructions of the ureters, especially after ureterorenoscopic lithotripsy. However, it also lead to intolerable symptoms, including haematuria, frequency or urgency of urination, dysuria, and flank pain. Therefore, patient education on self-care related to indwelling DJs is crucial for preventing morbidity.

Line is a popular mobile app in Japan, Taiwan, and Thailand; besides communication, it also offers modules for designing online chatbot that can automatically reply and interact with users for customer services. We developed a ‘Ureteric Stent Chatbot’ using the Line app (Figure 1). Through this chatbot they could ask and receive answers to questions related to DJs. We evaluated patients’ satisfaction with the app, its influence on their subjective experience of DJ-related symptoms and noticed the potential benefit of this tool for patient education. A retrospective study collecting data from patients’ medical chart was then conducted.

Methods and Materials

We retrospectively collected patients with indwelling DJs after URSL at our hospital from August 1st, 2019 to November 30th, 2019. All patients received face-to-face DJ education from medical staff before discharge, and an additional “Ureteric Stent Chatbot” was provided for willing patients.

All patients rated the severity of their DJ-related symptoms and the chatbot users rated their satisfaction with the chatbot on a five-point scale before DJ removal. We evaluated the effect of the program on the severity of DJ-related symptoms and the possible factors associated with satisfaction with the program.

We divided patients into ‘non-user group’, who received only face-to-face education, and the ‘program-user group’, who received both face-to-face education and program interaction. Fisher’s exact tests was used to examine the between-group differences in demographic characteristics, DJ-related symptom severity, as well as factors associated with patient satisfaction in the program-user group. We performed logistic analyses, including multivariate analysis with odds ratios (OR) and 95% confidence intervals (CIs) to examine factors related to gross haematuria. A P-value below 0.05 was indicative of statistical significance.

Table 1. Comparative demographic characteristics and symptomatology of the two education groups (N = 70)

| | Non-User Group (N = 20) | Program-User Group (N = 50) | P-value |
|---|----------------------------|--------------------------------|---------|
| Age | 52.8 ± 15.6 | 66.0 ± 7.6 | <0.001 |
| Male sex | 11 (55%) | 37 (74%) | 0.16 |
| Education level above college | 1 (5%) | 20 (40%) | 0.004 |
| Severe ureteric stent-related symptoms | | | |
| Flank pain | 6 (30%) | 18 (36%) | 0.63 |
| Gross hematuria | 3 (15%) | 33 (66%) | <0.001 |
| Frequency | 10 (50%) | 19 (38%) | 0.36 |
| Urgency | 7 (35%) | 7 (14%) | 0.09 |
| Difficulty in voiding | 1 (5%) | 2 (4%) | 0.99 |
| Unawareness of the necessity of stent removal | 3 (15%) | 2 (4%) | 0.14 |

Results

We included 70 patients; 50 had routine education by medical staff and elected to have additional interaction through the chatbot, while the remaining 20 received routine education by medical staff only. The patients in the program group were significantly younger (age <60 years: 74% versus 15%, P <.001), had higher education levels (40% versus 5%, P =.004), and reported more severe gross hematuria (66% versus 15%, P <.001) than did those in the medical-staff group. No differences were observed for other DJ-associated symptoms.

On multivariate analysis, severe gross hematuria was significantly associated with age below 60 years (odds ratio 6.704, P =.003, 95% CI 1.898–23.673) and the use of the program (odds ratio 6.63, P =.02, 95% 1.374–31.989). All 50 patients in the program group reported being satisfied (32%) or very satisfied (68%) with the program. Patients over 60 years were significantly more satisfied with the chatbot (35.5% versus 6.3%, P =.04). Education level, the severity of DJ-associated symptoms, and the recognition of the necessity of DJ removal were not significantly associated with the degree of satisfaction.

Discussion

In this study, we found that younger patients with a higher education level were more likely to select this novel communication tool. All the patients using chatbot reported being satisfied and very satisfied with this simple conversation agent. Customization of these existing free modules in communication apps for patient education would be a cost-effective approach to improving patient understanding and satisfaction.

Moreover, we also observed that older patients were more satisfied with the use of the chatbot. Application of this chatbot provided older adults with more time to understand the information provided by the medical staff, even after discharge, which is advantageous and time-effective for both patients and medical staff.

Our chatbot has been in use since 2019, preceding the outbreak of the COVID-19 pandemic. Since the pandemic, remote medical service and effective communication between medical staff and patients became even more critical. By using chatbot provided by mobile communication app, medical staff can design interactive counselling programs that are useful and well received by patients. We believe that this type of patient education is suitable for countries with high rates of smartphone use

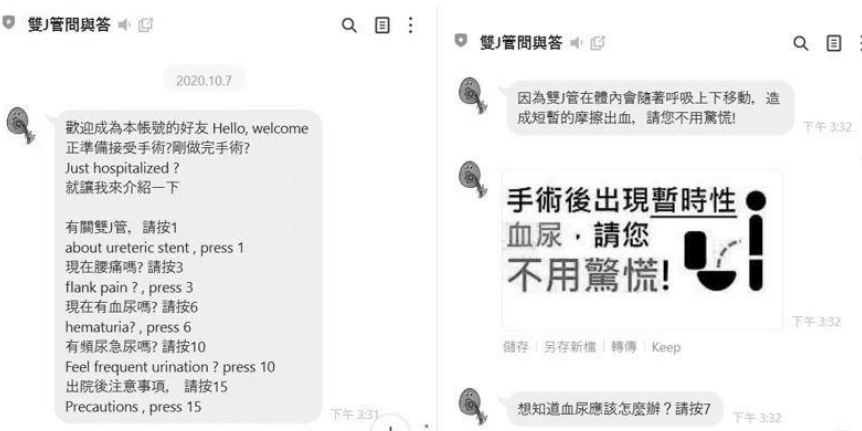


Figure 1. Example of a “Ureteric Stent Chatbot” Line application

Conclusions

The use of a free chatbot in mobile communication application resulted in high patient satisfaction, especially in elderly patients. Younger patients with higher education levels were more likely to adopt this new form of communication, which improved their knowledge of DJ-associated symptoms. This study demonstrates the benefits interactive application has for educating patients regarding their health through.

Table 2. Analysis of the degree of satisfaction with the chatbot according to demographic characteristics and symptomatology (N = 50)

| | Satisfied (score 4) (N = 16) | Very satisfied (score 5) (N = 34) | P-value |
|---|---------------------------------|--------------------------------------|---------|
| Age | 46.9 ± 15.5 | 57.2 ± 14.5 | 0.02 |
| Male sex | 14 (87%) | 23 (68%) | 0.18 |
| Education level above college | 5 (31%) | 15 (44%) | 0.39 |
| Severe ureteric stent-related symptoms | | | |
| Flank pain | 8 (50%) | 10 (29%) | 0.16 |
| Gross hematuria | 12 (75%) | 21 (62%) | 0.36 |
| Frequency | 8 (50%) | 11 (32%) | 0.23 |
| Urgency | 1 (6%) | 6 (18%) | 0.41 |
| Difficulty in voiding | 0 (0%) | 2 (6%) | 0.99 |
| Unawareness of the necessity of stent removal | 1 (6%) | 1 (3%) | 0.54 |

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