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Effects of the Transition from Bottle to PTP Packaging of Bictegravir/Emtricitabine/Tenofovir Alafenamide on Medication Management

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Abstract

Background

Press-through packaging (PTP) is widely used for oral medications in Japan. In contrast, many antiretroviral agents have traditionally been supplied in bottles, making their packaging distinct from that of most other oral medications. Bictegravir/emtricitabine/tenofovir alafenamide (B/F/TAF) was the first antiretroviral agent in Japan to adopt PTP packaging in addition to bottle packaging. This study aimed to evaluate changes in medication management practices and patient perceptions of packaging among patients who experienced the transition from bottle-packaged to PTP-packaged B/F/TAF and to investigate the impact of this transition on daily medication management.

Methods

This study was a single-center, prospective, questionnaire-based study conducted at Hiroshima Citizens Hospital. The questionnaires were administered before the transition from bottle-packaged to PTP-packaged B/F/TAF and at least 3 months after the transition. The questionnaires assessed medication management practices, perceptions of packaging, and satisfaction with the packaging. In addition, free-text responses regarding the packaging were collected.

Results

A total of 15 participants were included in this study. During the bottle packaging survey, 5 participants (33.3%) reported being satisfied with the packaging, whereas 12 (80.0%) reported being satisfied in the PTP packaging survey. The number of participants who reported transferring B/F/TAF to another container, such as a pill organizer, decreased from 6 (40.0%) before the transition to 2 (13.3%) after the transition. Compared with bottle packaging, more participants perceived PTP packaging as being easier to carry and allowing easier confirmation of the remaining tablets. Free-text responses indicated that the smaller printed medication name was perceived as beneficial for privacy and that the absence of noise when carrying the medication was appreciated.

Conclusions

Our findings suggest that PTP packaging of B/F/TAF may improve patient satisfaction by addressing concerns regarding portability and privacy. Furthermore, this packaging transition may contribute to favorable changes in daily medication management practices among people living with HIV.

Background

Antiretroviral therapy (ART) effectively suppresses human immunodeficiency virus (HIV) replication and restores immune function in people living with HIV (PLWH). As a result, the life expectancy of PLWH has markedly improved. However, because HIV establishes latent infection in CD4 + T cells [1,2], lifelong ART is generally required to maintain viral suppression [3]. In addition, optimal adherence to ART is essential for maintaining HIV viral suppression [4]. Because ART is required throughout life, selecting treatment regimens with minimal impact on quality of life (QOL) is important.

In recent years, single-tablet regimens (STRs), which consist of multiple antiretroviral agents in a single tablet, have become widely used. Compared with multi-tablet regimens, STRs are associated with improved medication adherence and better QOL [5]. Among available STRs, bictegravir/emtricitabine/tenofovir alafenamide (B/F/TAF) is recommended as an initial antiretroviral regimen [6]. It is also recommended for treatment-naive patients in the Japanese HIV treatment guidelines [7] and is widely prescribed in Japan.

In Japan, press-through packaging (PTP) is widely used for oral medications. In contrast, many antiretroviral agents have traditionally been supplied in bottles, making their packaging distinct from that of most other oral medications. B/F/TAF was the first antiretroviral agent in Japan to adopt PTP packaging in 2022. Bottle and PTP packaging may differ in several aspects of medication management, such as the ease of checking the remaining tablets and portability. To protect against moisture, B/F/TAF is supplied with a desiccant and is recommended to be stored in its original packaging [8]. However, some PLWH transfer their medications to pill organizers for medication management, and their use has been associated with improved medication adherence [9]. In addition, previous studies have reported that many patients transfer their antiretroviral agents to alternative containers because of concerns regarding portability, privacy, and HIV-related stigma [10,11]. Therefore, changes in packaging may influence not only medication management practices but also patients' perceptions of their medication.

Previous studies conducted outside Japan have reported that switching B/F/TAF to blister packaging was associated with improved satisfaction with ART [12]. However, detailed information regarding how packaging changes affect patient perceptions of B/F/TAF remains limited. Furthermore, because PTP packaging is widely used in Japan, it is important to evaluate how the transition from bottle to PTP packaging influences medication management practices in real-world clinical settings.

At Hiroshima Citizens Hospital, the packaging of B/F/TAF was changed from bottle packaging to PTP packaging in December 2025. Therefore, this study aimed to evaluate changes in medication management practices and patient perceptions of packaging before and after the transition from bottle to PTP packaging.

Methods

Study design and participants

This was a single-center, prospective, questionnaire-based study conducted at Hiroshima Citizens Hospital, where the packaging of B/F/TAF was changed from bottle packaging to PTP packaging in December 2025. The study evaluated changes in daily medication management practices and patient perceptions of packaging before and after the transition.

Patients who met all of the following criteria were included: (1) had been receiving bottle-packaged B/F/TAF for at least 3 months before the bottle packaging survey, (2) continued B/F/TAF treatment for at least 3 months after the transition to PTP packaging, and (3) provided written informed consent to participate in the study.

Questionnaire survey

A study-specific questionnaire developed by the investigators was used in this study. Patients who provided written informed consent were given a paper-based questionnaire during an outpatient visit, which was collected after completion. The questionnaire was completed anonymously. Medication adherence was assessed on the basis of self-reported missed doses during the previous month. Satisfaction with each packaging format was evaluated using a three-point scale (“satisfied,” “neutral,” or “dissatisfied”). The free-text responses were reviewed by the investigators and grouped into categories based on common themes. The comments within each category were summarized while preserving their original meaning.

Bottle packaging survey

Patients were surveyed using a questionnaire that assessed medication management practices at home, medication adherence, and satisfaction with the bottle packaging (Fig. 1). The original questionnaire was developed in Japanese and translated into English for presentation in Fig. 1. The survey was conducted before the transition from bottle-packaged to PTP-packaged B/F/TAF.

PTP packaging survey

Following the transition to PTP packaging, patients were surveyed using a questionnaire that assessed medication management practices, medication adherence, and satisfaction with PTP packaging (Fig. 2). The original questionnaire was developed in Japanese and translated into English for presentation in Fig. 2. Given the routine interval between outpatient visits at our hospital, the survey was conducted at least 3 months after the transition to PTP-packaged B/F/TAF.

Data collection

Demographic and clinical data, including age, sex, duration of HIV infection, duration of ART, HIV-1 ribonucleic acid viral load, CD4 + T-cell count, concomitant medications, and use of supplements, were

retrospectively collected from the electronic medical records. When data were not available in the medical records, additional information was obtained through patient interviews conducted by pharmacists during routine outpatient visits. Baseline patient characteristics and laboratory data were collected at the time of the bottle packaging survey.

Statistical analysis

Continuous variables are presented as median (interquartile range), and categorical variables are presented as numbers and percentages. Only descriptive statistics were used, and no inferential statistical analyses were performed.

Ethics approval

This study was approved by the Ethics Committee of Hiroshima Citizens Hospital (Application No. 2025-71). It was conducted in accordance with the Ethical Guidelines for Medical and Biological Research Involving Human Subjects and the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to study participation.

Results

Patient characteristics

A total of 15 participants were included in this study, and all completed the questionnaire survey. Patient characteristics are summarized in Table 1. The median age was 47 years (interquartile range, 41.4–51.5 years), and all participants were male.

Table 1
Baseline patient characteristics

Bottle packaging survey

Among the 15 participants, 9 (60.0%) reported storing B/F/TAF in the original bottle packaging, whereas 6 (40.0%) reported transferring the medication to another container, such as a pill organizer. Regarding satisfaction with bottle packaging, 5 participants (33.3%) reported being satisfied, 7 (46.7%) were neutral, and 3 (20.0%) were dissatisfied. With respect to medication adherence during the previous month, 13 participants reported no missed doses. One participant reported missing one dose, and another reported missing three doses. Analysis of the free-text responses revealed comments related to noise generated when carrying the bottle and difficulty opening the bottle. All categorized and summarized free-text comments are presented in Table 2.

Table 2
Free-text comments regarding bottle packaging

PTP packaging survey

The results of the questionnaire survey are summarized in Table 3. Compared with bottle packaging, PTP packaging was more frequently perceived as being easier to carry and allowing easier confirmation of the remaining tablets. After the transition to PTP packaging, 13 participants (86.7%) reported storing B/F/TAF in the original PTP packaging, whereas 2 (13.3%) reported transferring the medication to another container, such as a pill organizer. This proportion was lower than that observed during the bottle packaging survey. Regarding satisfaction with PTP packaging, 12 participants (80.0%) reported being satisfied, 1 (6.7%) was neutral, and 2 (13.3%) were dissatisfied. The number of participants who reported being satisfied was higher during the PTP packaging survey than during the bottle packaging survey. With respect to medication adherence during the previous month, 13 participants reported no missed doses. One participant reported missing two doses, and another reported missing three to four doses. Analysis of the free-text responses revealed comments indicating that the medication name printed in small text was considered beneficial for privacy and that the medication did not make noise when carried. All categorized and summarized free-text comments are presented in Table 4.

Table 3
Participant perceptions of bottle and PTP packaging

Table 4
Free-text comments regarding PTP packaging

Discussion

Optimal adherence to ART is essential for maintaining viral suppression in PLWH. In this study, we evaluated changes in medication management practices and patient perceptions of packaging following the transition from bottle to PTP packaging of B/F/TAF. The principal findings were that most participants reported satisfaction with PTP packaging and that fewer participants transferred their medication to alternative containers, such as pill organizers, after the transition from bottle to PTP packaging.

A previous study reported that switching to blister packaging was associated with improved treatment satisfaction [12], and our findings suggest a similar trend in Japan. Treatment satisfaction has attracted increasing attention as an important treatment outcome in HIV care. Previous studies have demonstrated that higher treatment satisfaction is associated with better self-rated health status, improved medication adherence, and enhanced QOL [13,14]. Therefore, the improvement in satisfaction related to the packaging of B/F/TAF observed in this study may contribute to clinically meaningful patient-centered outcomes in HIV care.

In addition to improving adherence, previous studies have reported that patients transfer antiretroviral agents to alternative containers because of concerns regarding portability, privacy, and HIV-related stigma [9–11]. Consistent with these reports, some participants transferred B/F/TAF from the original bottle to alternative containers, such as pill organizers. The free-text responses suggested that concerns regarding portability and privacy were among the reasons for transferring medications to alternative containers. Notably, the transfer of medications to alternative containers decreased after the transition to PTP packaging. This finding may be explained by patients perceiving PTP packaging as more appropriate in terms of both portability and privacy. To the best of our knowledge, this is the first study to demonstrate not only patient perceptions of packaging but also actual changes in daily medication management practices following the transition from bottle to PTP packaging. B/F/TAF is recommended to be stored in its original packaging, regardless of packaging type, to maintain product quality [8]. Therefore, the reduction in transferring medications to alternative containers after the transition to PTP packaging may also have been beneficial from the perspective of appropriate medication storage.

Interestingly, although more participants perceived PTP packaging as being less likely to result in missed doses, the number of participants reporting missed doses did not change between the bottle and PTP packaging surveys. This finding suggests that medication adherence behaviors are not solely dependent on packaging type but are influenced by multiple complex factors [15,16]. Therefore, individualized adherence support remains necessary to maintain optimal adherence among PLWH.

This study has several limitations. First, this was a single-center study with a small sample size, and caution is therefore required when generalizing these findings to the broader population of PLWH in Japan. In addition, all participants were male. Second, because the evaluation was conducted three months after the transition to PTP packaging, the long-term effects on medication management practices and treatment outcomes remain unclear and warrant further investigation. Finally, although the number of participants transferring medications to alternative containers decreased after the transition to PTP packaging, this practice persisted in some participants. This may be because transferring medications to alternative containers is influenced by established patient routines and concerns unrelated to packaging type, such as HIV-related stigma, which may not be easily changed by changes in packaging alone.

Conclusions

Our findings suggest that PTP packaging of B/F/TAF may improve patient satisfaction by addressing concerns regarding portability and privacy. Furthermore, this transition may contribute to favorable changes in daily medication management practices among PLWH. Given that many antiretroviral agents are still supplied in bottles, greater consideration should be given to packaging type in the provision of patient-centered HIV care.

Abbreviations

ART
Antiretroviral therapy
HIV
Human immunodeficiency virus
PLWH
People living with HIV
QOL
quality of Life
STRs
single-tablet regimens
B/F/TAF
bictegravir/emtricitabine/tenofovir alafenamide
PTP
press-through packaging

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Hiroshima Citizens Hospital (Application No. 2025-71). It was conducted in accordance with the Ethical Guidelines for Medical and Biological Research Involving Human Subjects and the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to study participation.

Consent for publication

Not applicable

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

TS designed the study, collected, analyzed, and interpreted the data, and was a major contributor to writing the manuscript. YS and JM provided guidance to TS on the study design and contributed to data collection and analysis. KS and AW provided guidance to TS throughout the study and finalized the overall structure of the manuscript. All authors read and approved the final manuscript.

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Not applicable

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Tables

Tables are available in the Supplementary Files section.

Figures

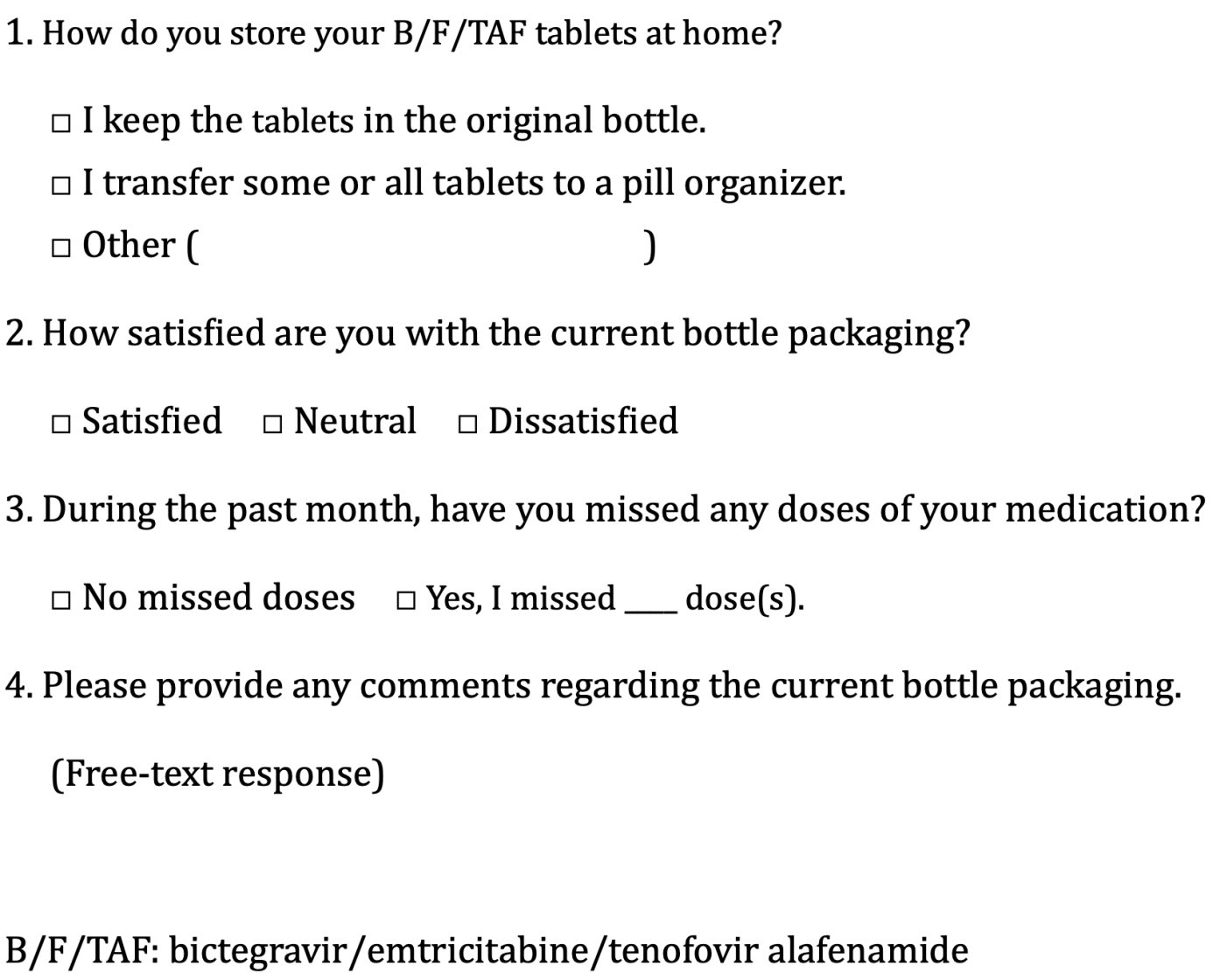


Figure 1

Questionnaire for the bottle packaging survey.

1. Which packaging type is easier to use for taking your medication?*

* Including the entire process from removing the tablet from its packaging to taking the medication.

□ Bottle packaging □ No difference □ PTP packaging

2. Which packaging type better protects your privacy?

□ Bottle packaging □ No difference □ PTP packaging

3. Which packaging type is easier to carry?

□ Bottle packaging □ No difference □ PTP packaging

4. Which packaging type makes it easier to confirm the remaining tablets?

□ Bottle packaging □ No difference □ PTP packaging

5. Which packaging type helps prevent missed doses?

□ Bottle packaging □ No difference □ PTP packaging

6. How do you store your B/F/TAF tablets at home?

□ I keep the tablets in the original PTP packaging.
□ I transfer some or all tablets to a pill organizer.
□ Other ( )

7. How satisfied are you with the current PTP packaging?

□ Satisfied □ Neutral □ Dissatisfied

8. During the past month, have you missed any doses of your medication?

□ No missed doses □ Yes, I missed ___ dose(s).

9. Please provide any comments regarding the current PTP packaging.
(Free-text response)

B/F/TAF: bictegravir/emtricitabine/tenofovir alafenamide, PTP: press-through packaging

Figure 2

Questionnaire for the PTP packaging survey.

Supplementary Files

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- Tables.docx