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Communications Medicine

https://doi.org/10.1038/s43856-026-01679-3

Article in Press

Evaluating the Clinical and Humanistic Impact of a Self-Care and Minor Ailment Service (MAS)

Received: 17 August 2025

Accepted: 18 May 2026

Cite this article as: Cheung, C.I., Yiu, H.H., Ng, V.W. *et al.* Evaluating the Clinical and Humanistic Impact of a Self-Care and Minor Ailment Service (MAS). *Commun Med* (2026). https://doi.org/10.1038/s43856-026-01679-3

Chi Iam Cheung, Hei Hang Edmund Yiu, Vanessa Wai Sei Ng, Frank Nim Kok Chan, Janet Hiu Tung Sun, Natalie Hoi Ching Hung, Ryan Hei Ming Mak, Marco Tsun Lee, Tommy Ka Ho Lee, Gladys Daphne Cheung, Kitty Kit Ki Law, Franco Wing Tak Cheng, Anchor Tak Fung Hung, Timothy F. Chen, Esther Wai Yin Chan, Ian Chi Kei Wong & Eric Yuk Fai Wan

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Title: Evaluating the Clinical and Humanistic Impact of a Self-Care and Minor Ailment Service (MAS)

Authors
Chi lam Cheung, BMedSc[1,2†]; Hei Hang Edmund Yiu, PhD[1†]; Vanessa Wai Sei Ng, PhD[1†]; Frank Nim Kok Chan, BSSc[1]; Janet Hiu Tung Sun, MA[1]; Natalie Hoi Ching Hung, BSocSc[1]; Ryan Hei Ming Mak, MPH[1]; Marco Tsun Lee, MClinPharm[1]; Tommy Ka Ho Lee, MClinPharm[1]; Gladys Daphne Cheung, MClinPharm[1]; Kitty Kit Ki Law, MClinPharm[1]; Franco Wing Tak Cheng, PhD[1,3,4]; Anchor Tak Fung Hung, DBA[1]; Timothy F Chen, PhD[5]; Esther Wai Yin Chan, PhD[1,4,6]; Ian Chi Kei Wong, PhD[1,4,7,8*]; Eric Yuk Fai Wan, PhD[1,2,7,9*]
[†] Co-first authors
* Co-corresponding authors

Affiliations
[1] Centre for Safe Medication Practice and Research, Department of Pharmacology and Pharmacy, LKS Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China
[2] Department of Family Medicine and Primary Care, School of Clinical Medicine, LKS Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China
[3] Pharmacy Department, Gleneagles Hong Kong Hospital, Hong Kong SAR, China
[4] Department of Pharmacy, The University of Hong Kong-Shenzhen Hospital, Shenzhen, China
[5] The University of Sydney School of Pharmacy, Sydney, NSW, Australia
[6] The University of Hong Kong Shenzhen Institute of Research and Innovation, Shenzhen, China
[7] Advanced Data Analytics for Medical Science Limited, Hong Kong SAR, China
[8] Aston Pharmacy School, Aston University, Birmingham, UK
[9] The Institute of Cardiovascular Science and Medicine, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong Special Administrative Region, China

Address for correspondence
Prof. Ian C.K. Wong and Prof. Eric Y.F. Wan
Department of Pharmacology and Pharmacy
General Office, L02-56 2/F
Laboratory Block LKS Faculty of Medicine
The University of Hong Kong
21 Sassoon Road, Pokfulam
Hong Kong SAR, China
Tel: +852 2831 5110
E-mail: wongick@hku.hk, yfwan@hku.hk

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Abstract

Background: Minor ailments contribute significantly to the burden on healthcare systems. The introduction of a Minor Ailment Service (MAS) may alleviate pressure from hospital Accident & Emergency departments by directing patients suffering from minor ailments to be managed within the community. Although MAS has demonstrated positive results internationally, its effectiveness and acceptability in Hong Kong have not been evaluated. This prospective observational study aims to evaluate the clinical and humanistic impacts of a MAS delivered by pharmacists at community pharmacies operated by non-governmental organisations (NGOs) in Hong Kong.

Methods: Subjects were recruited using convenience sampling at eight NGO-operated community pharmacies. Patient-reported outcomes, including symptom resolution, satisfaction, and enablement, were collected using a follow-up questionnaire one week after MAS. Additionally, consultation records were matched and extracted from the Community Pharmacy Services System. Descriptive data analyses were conducted to evaluate the patient-reported outcomes after using MAS. Factors influencing the primary outcomes were assessed using mixed-effects linear and logistic regression models.

Results: This study demonstrates that most subjects (95.1%) report improvement in their symptoms. The mean scores for the Pharmacy Services Questionnaire and Patient Enablement Instrument are 4.0±0.8 out of 5 and 6.8±3.2 out of 12, respectively. Minor ailments relating to the respiratory system are most frequently reported. Significant negative associations in symptom resolution, satisfaction, and enablement are mainly observed in patients suffering from central nervous system-related symptoms.

Conclusions: Patients receiving MAS provided by community pharmacists in community pharmacies report high levels of symptom resolution, satisfaction and enablement.

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Plain language summary

Minor ailments contribute significantly to the burden on the healthcare system, primarily in hospital Accident & Emergency departments. The introduction of the pharmacist-led Minor Ailment Service aims to redirect the management of minor ailments to community pharmacies. This study evaluated patient satisfaction, enablement, and symptom resolution rates of the Minor Ailment Service. Our results demonstrate that the Minor Ailment Service can effectively help patients achieve improvement in their symptoms, with patients feeling satisfied and enabled after using the service. Minor ailments relating to the respiratory system are most frequently reported, and central nervous system-related symptoms are associated with poorer symptom resolution, satisfaction and enablement. Therefore, the Minor Ailment Service may alleviate pressure from overburdened and higher-cost healthcare services.

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Introduction

Minor ailments are defined as conditions that are not severe, self-limiting, and typically resolve without the need for medical intervention (e.g., from general practitioners)[1]. In Hong Kong, most patients with minor ailments prefer to consult medical practitioners for treatment and medication[2]. This is due to the highly subsidised care provided by the public healthcare system, patients typically visit Accident and Emergency (A&E) departments in public hospitals, which leads to the overstretching of public health institutions and results in long waiting lists and extended waiting times for healthcare services, especially in hospital A&E departments, where waiting times for non-urgent and semi-urgent cases typically exceed 110 minutes on average[2, 3]. Recent data from the Hong Kong Hospital Authority reported that approximately 60% of A&E visits were semi-urgent or non-urgent cases[4]. A local study has previously demonstrated an urgent need to establish a system for diverting and managing non-urgent patients to primary or community care facilities[5]. By redirecting these non-urgent and semi-urgent cases to community-based care, the utilisation of high-cost healthcare resources, such as A&E and general practitioner (GP) clinics, can be better allocated to individuals with more severe or urgent conditions, thereby reducing waiting times and optimising patient care. Additionally, patients in Hong Kong may prefer to visit private GPs, where these clinics can dispense medications directly at the point of care, and some patients may have medical insurance to cover the consultation fee[2]. Therefore, these factors collectively contribute to a dynamic in which patients preferentially seek medical care from medical practitioners rather than community pharmacists[2].

Currently, community pharmacies in Hong Kong are regulated by the Drug Office of the Department of Health, and are mostly owned and operated by chain organisations or independent private entities, where pharmacists primarily sell over-the-counter (OTC) products, pharmacist-only medications and prescription medications to the general public[2]. Recently, eight community pharmacies operated by non-governmental organisations (NGOs) in Hong Kong have been established as part of the Jockey Club PHARM+ Community Medication Service Network, which was initiated and funded by The Hong Kong Jockey Club Charities Trust in partnership with the University of Hong Kong, the Chinese University of Hong Kong, and eight NGOs, which aims to expand the scope of practice of community pharmacies and enhance the accessibility of affordable pharmaceutical care, such as community dispensing service, minor ailment service (MAS) and medication management services[2, 6]. Despite these developments, several key barriers persist. Notably, pharmacists in Hong Kong lack statutory prescribing authority, whereas physicians possess both prescribing and dispensing privileges[2]. In contrast to the United Kingdom's (UK) Pharmacy First scheme, community pharmacists are authorised to supply prescription-only medicines under predefined clinical protocols[2].

Internationally, MAS delivered by community pharmacists has demonstrated positive outcomes in countries such as Australia, Canada, the UK, and Spain[7, 8, 9, 10]. These studies reported high rates of symptom resolution and patient satisfaction while also indicating low re-consultation rates for all healthcare professionals. These findings suggest that MAS is an effective approach for managing minor ailments within the community. However, the applicability and effectiveness may vary significantly across different regions due to differences in demographics, chronic disease prevalence, existing primary care services, and other healthcare policies. Additionally, a previous study conducted in the United Kingdom reported that males experienced higher rates of symptom resolution following MAS, whereas individuals who were not part of the labour force or those who

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had ever been married showed lower rates of symptom resolution[11]. This study aimed to evaluate the effectiveness of a MAS delivered by community pharmacists at community pharmacies in Hong Kong. The results show that the MAS yields a high symptom resolution rate, patient satisfaction and enablement. These findings suggest that MAS can effectively manage minor ailments and potentially help reduce the burden on higher-cost healthcare settings.

Methods

Recruitment procedures and study design

A prospective observational study design was adopted for this research. Study subjects were recruited from eight community pharmacies operating under the Jockey Club PHARM+ Community Medication Service Network. Individuals aged 18 years or above who suffered from minor ailment(s) and visited the community pharmacy in person for MAS with community pharmacists were eligible to participate in this study. Subjects who could not provide informed consent, could not communicate in Chinese, Cantonese or English, made direct product request(s) only, or requested MAS on another person's behalf were excluded from the study. Eligible individuals were identified and recruited using convenience sampling by community pharmacists in eight NGO-operated community pharmacies. Subjects who visited the community pharmacies for MAS between 1st June 2024 and 31st August 2024 were recruited by community pharmacists after receiving the MAS. Written informed consent was obtained from all study subjects upon enrolment. The follow-up questionnaire was sent to study subjects by Short Message Service, or they were contacted by telephone seven days after the index consultation. Subjects were considered lost to follow-up if they did not respond to the survey after five telephone call attempts or completed it more than 12 days after the index consultation. After completing the follow-up questionnaire, each participant received a HKD$100 supermarket voucher (approximately equivalent to USD$13) as an incentive. The selection of follow-up period after the initial MAS episode was informed by previous literature, where most studies adopted a 7-14-day follow-up interval[7, 9, 12, 13]. Therefore, a 7-day follow-up period was adopted to reduce the likelihood of potential recall bias and to account for the potential attrition rate due to loss to follow-up, compared to a longer follow-up period.

Pharmacists responsible for delivering the MAS received at least 6 hours of face-to-face training from pharmacists and researchers at the University of Hong Kong, offered at each community pharmacy. The training session was delivered using a combination of case studies and presentations, which were finally assessed using the objective structured clinical examination approach. The training session was intended to ensure that pharmacists are competent in providing MAS consistently, able to make differential diagnoses and identify red flag or alarming symptoms, further develop communication and consultation skills, and are familiar with using the Community Pharmacy Services System (CPSS) for documentation.

Outcomes

The primary outcomes were a self-reported symptom resolution rate seven days after MAS, patient satisfaction, and patient enablement. Secondary outcomes were the subject's presenting minor ailment symptoms, medications dispensed during MAS, community pharmacists' recommendations to other healthcare practitioners, and the re-consultation rate to all healthcare providers.

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Data collection

Electronic patient records were recorded and collected using the CPSS. The CPSS is a clinical documentation system used to document patient data, including socio-demographics, presenting symptoms, interventions provided, management plans, and medication dispensing records. Presenting symptoms were classified according to the Common Clinical Conditions and Minor Ailments developed by the NHS Education for Scotland[14]. Patient records were extracted from the CPSS and matched against the personal information provided during the consent collection and sign-up process. All data were anonymised using a pseudo-identification number to ensure the anonymity of participants. Ethical approval for this study was granted by the Institutional Review Board of The University of Hong Kong/Hospital Authority Hong Kong West Cluster (HKU/HA HKW IRB), with reference number UW 23-539. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist was used to guide the reporting of the study[15] .

In the follow-up questionnaire, subject demographics were gathered using a simple demographic questionnaire. In addition, participants were asked to describe the status of their minor ailment symptoms using a three-point scale (fully resolved, relieved but not fully resolved, and no improvement or worsened), whether they had re-consulted with community pharmacists, utilised other health services, such as A&E Department, General Outpatient Clinics, Chinese Medicine Practitioners, allied health or dental services, or had been hospitalised for their minor ailment after using MAS (Appendix 1).

Patient enablement was assessed using the Patient Enablement Instrument (PEI), which was validated by Lam *et al.* in 2010[16, 17]. The PEI is widely utilised worldwide and regarded as the gold standard for measuring patient enablement[18]. It consists of a six-item questionnaire that evaluates a patient's ability to cope with life and manage their illness following the use of the MAS. Each item was scored on a three-point scale (2: greatly improved/increased, 1: slightly improved/increased, and 0: the same or less). The total PEI score was calculated by the mean score of applicable items multiplied by 6, responses were excluded if they contained more than three questions answered as 'not applicable' [17]. The total PEI score ranges from 0 to 12, where scores of ≥ 1 indicate enablement and higher scores signify greater enablement[18].

Patient satisfaction was assessed using the validated version of the Pharmacy Services Questionnaire (PSQ), initially developed by Larson *et al.* in 2002[19]. The PSQ is a 20-item questionnaire consisting of two domains: Friendly Explanation (FE) and Managing Therapy (MT). The FE dimension includes items relating to overall satisfaction, such as the professionalism of community pharmacists and other pharmacy staff, the pharmacist's availability to answer potential questions, and the pharmacy setting[19]. Meanwhile, the MT dimension incorporates items concerning the provision of pharmaceutical care, including the community pharmacist's ability to offer advice and other interactions during MAS with the pharmacist[19]. Patients rated each item on a five-point Likert scale ranging from 'poor' to 'excellent'[19]. The total PSQ score was calculated as the mean score of applicable items and ranges from 1 to 5 points[19].

Sample size calculation

Assuming 50% of recruited patients will not consult with other healthcare professionals after using the MAS, with an intra-class coefficient of 0.01, a minimum sample size of 740 participants is required statistically to estimate the expected proportion with 5% absolute precision and 95%

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confidence[20]. A recruitment target of 1,056 participants (132 per NGO) was set to account for a 30% attrition rate.

Statistical analysis

Descriptive analyses were conducted to evaluate symptom resolution, patient satisfaction and enablement after using MAS. The mixed-effects linear and logistic regression models were used to assess the associations between symptom resolution status 7 days after MAS, PSQ score, PEI score, and potential factors (i.e., symptom classes of presenting symptoms, subject demographics, and whether prior treatment was sought before using MAS). The associations between all potential factors and each primary outcome were analysed together in a single model. Potential factors were selected based on a Directed Acyclic Graph (DAG), clinical relevance and prior literature[11] (Supplementary Figure 1). All regression models were adjusted for clustering between sites (NGO pharmacies) as a random effect. Patient demographics were aggregated into groups based on categorisation according to government statistics published by the Hong Kong Census and Statistics Department[21, 22]. Multiple imputation by chained equations was used to address the presence of missing data. Five imputations were carried out, particularly for those who had completed the survey but chose "don't know" or "refuse to answer" for marital status and household income[23]. All data analyses were conducted using R Studio version 4.2.2 and Stata version 18.5. Adjusted point estimates (coefficients and odds ratios (OR)) were determined with 95% confidence intervals (95%CI), and p values ≤ 0.05 were considered statistically significant. Two individual analysts (CLC and FNKC), with expertise in different statistical software, performed all statistical analyses independently to ensure the quality and robustness of the results.

Sub-group analysis

Patient satisfaction, patient enablement, and symptom resolution were compared with patient demographics using the Pearson Chi-square ($\chi 2$) test, one-way analysis of variance (ANOVA), and an independent sample t-test. Additionally, due to the significant number of responses with "don't know" or "refuse to answer" for household income, the baseline difference was tested using the Pearson Chi-square ($\chi 2$) test and an independent sample t-test between those who reported income and those who did not.

Results

Baseline characteristics of the study cohort

A total of 1,309 subjects were enrolled in the study between 1st June 2024 and 31st August 2024, of which 289 subjects were excluded as they were unreachable using the provided contact, refused to complete the follow-up questionnaire, completed the survey more than 12 days after using MAS, withdrew from the study, or were lost to follow-up (Figure 1). Consequently, 1,020 subjects completed the follow-up questionnaire and were included in the analysis. Furthermore, the clinical data of 945 subjects were successfully matched from the CPSS (Figure 1). The mean age of the study cohort was 54.4 ± 16.8 years. Details of the participants' baseline characteristics and demographics are summarised in Table 1.

Characteristics of MAS consultations

The most common symptoms presented at the community pharmacies for MAS were related to the respiratory system (39.2%), followed by symptoms associated with the central nervous system (CNS) (30.2%) and dermatological conditions (19.1%) (Table 1). Meanwhile, the most commonly

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reported symptoms included musculoskeletal pain (19.2%), the common cold (14.6%), and cough (9.5%) (Supplementary Table 1). Most participants (86.7%) received guidance on selecting appropriate medications/products, or were educated on the proper use of these medications (77.3%). Other interventions provided during MAS are detailed in Supplementary Table 2.

Approximately half (50.3%) of patients receiving MAS were supplied with medicines after consultation. Of the 859 over-the-counter products dispensed, the majority were medications for the symptomatic relief of minor respiratory system-related ailments. The most commonly dispensed drugs were antihistamines (16.1%), mucolytics (10.0%), and cough preparations (8.6%) (see Supplementary Table 4). Other medications dispensed, classified according to the BNF classifications, are presented in Supplementary Table 4. A small proportion (3.5%) of subjects were advised by community pharmacists to consult other healthcare professionals, such as GPs (46.9%) and physiotherapists (34.4%) (see Supplementary Table 5).

Outcomes at follow-up

At the 7-day follow-up, most subjects (95.1%) had experienced different extents of improvement in their symptoms. Among them, 60.9% reported improvement but not completely resolved, while 34.2% had fully recovered.

Most subjects (86.6%) reported not needing to seek additional healthcare services after using the MAS offered by the community pharmacists (Supplementary Table 5). Only 13.4% of the subjects reported utilising healthcare services from other professionals, namely Public General Outpatient Clinics (43.1%), followed by Chinese Medicine Practitioners (41.6%) and Private General Outpatient Clinics (24.8%) (Supplementary Table 5).

Regarding patient satisfaction, the mean PSQ score was 4.0 ± 0.8 out of 5. Study subjects rated community pharmacists highly for their performance in managing medications, their availability to answer questions, and their ability to provide advice on medication-related concerns (Supplementary Table 6). The mean PEI score was 6.8 ± 3.2 out of 12, indicating high levels of enablement after using MAS (Supplementary Table 6).

Significant negative associations were found between PSQ scores and older age groups: 55-64 (-0.41; 95%CI: -0.70, -0.13; p=0.004), and ≥65 (-0.51; 95%CI: -0.80, -0.22; p<0.001) (Table 2). In addition, males were associated with a higher level of satisfaction with the pharmacy services than females, as reflected by a higher PSQ score by 0.23 points (0.23; 95%CI: 0.13, 0.33; p<0.001) compared to females. (Table 2). The associations between subject characteristics and PEI score are summarised in Table 2. Patients with CNS and gastrointestinal symptoms were associated with lower patient enablement, reflected by lower PEI scores of 0.98 points (-0.98; 95%CI: (-1.63, -0.33; p=0.003) and 0.99 points (-0.99; 95%CI: -1.70, -0.28; p=0.006), respectively (Table 2).

Furthermore, there were statistically significant negative associations between age groups 45-54 (OR: 0.32; 95%CI: 0.13, 0.81; p=0.016), 55-64 (OR: 0.25; 95%CI: 0.10, 0.61; p=0.002), ≥65 (OR: 0.40; 95%CI: 0.16, 0.97; p=0.044) and symptom resolution (Table 2). Generally, older individuals tended to have lower reported symptom resolution rates after using the MAS. Patients experiencing CNS (OR: 0.46; 95%CI: 0.26, 0.81; p=0.007) and dermatological (OR: 0.54; 95%CI: 0.30, 0.97; p=0.040) symptoms showed negative associations with symptom resolution, respectively (Table

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2). In addition, patients with household income of more than HKD$30,000 were associated with substantially higher rates of symptom resolution (OR: 1.72; 95%CI: 1.16, 2.56; p=0.008) respectively.

The results of the regression analyses are summarised in Table 2. The complete-case analysis is generally consistent with the main (imputed) analysis. Patients suffering from CNS symptoms generally have worse satisfaction, enablement, and symptom resolution rates compared to those who did not present with CNS symptoms in both the main and complete-case regression models (Table 2). Additionally, multicollinearity and model fit of the regression models were tested (Supplementary Table 7). Since no Variance Inflation Factor (VIF) exceeded 10, no serious multicollinearity was found[24]. Furthermore, regression models for both PSQ (mean $R^2 = 0.155$; mean adjusted $R^2 = 0.137$) and PEI (mean $R^2 = 0.091$; mean adjusted $R^2 = 0.072$) show a modest fit, respectively. The Hosmer-Lemeshow goodness-of-fit test indicates a good fit for the logistic regression model for symptom resolution rate ($p = 0.775$).

Sub-group analysis

Sub-group analyses were performed to assess differences in PSQ score, PEI score and symptom resolution status based on patient demographics (Supplementary Table 8). In general, patients who were male, aged 18–44 years, never married, more highly educated, employed, and with household income above HKD$30,000 had significantly higher satisfaction, greater enablement, and better symptom resolution status. Sensitivity analysis of baseline characteristics was carried out between individuals who reported household income and those who did not. The results indicated that there were no between-group differences, except for age group, for which a significant difference was found ($p = 0.017$).

Discussion

Our study found that most patients achieved varying degrees of symptom relief after using MAS. Patients reported high satisfaction and empowerment, particularly regarding pharmacist performance and availability.

Similar to other studies evaluating MAS conducted in Australia, Spain, and the United Kingdom, most participants presented to community pharmacies with respiratory symptoms or musculoskeletal pain[8, 11, 25, 26]. In contrast, research from Canada and Switzerland identified cold sores and cystitis as the most prevalent minor ailments respectively[27, 28]. Nevertheless, the observed difference may be attributed to the difference in management protocols and the availability of OTC/non-prescription medications in different countries for minor ailments. For example, community pharmacists in Switzerland can prescribe specific antibiotics to patients with cystitis in accordance with a predefined protocol[27]. Cystitis typically requires management by physicians in Hong Kong, as antibiotics used to treat cystitis are prescription-only items[29].

A large proportion of patients (95.1%) experienced complete symptom resolution or relief after using MAS, which was consistent with the results from other studies conducted in Australia (94.0%), Canada (90.4%), and Switzerland (84.7%)[7, 27, 28]. However, our findings revealed that a lower proportion of participants (32.3%) achieved complete resolution of their minor ailments than those reported in a systematic review (68% to 94%[30]. Nevertheless, the lower complete resolution rates may be due to our study's shorter follow-up period of 7 days compared to 14 days or longer

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follow-ups used in the reviewed studies[30]. In addition to the relatively shorter follow-up interval, there are currently no standardised protocols for MAS management in Hong Kong. Therefore, overseas guidelines from other countries are often used to guide the delivery of MAS locally, which may result in variations in practice and potentially lower optimal symptom resolution rates.

However, we found that patients with increasing age and those who were suffering from CNS symptoms were associated with lower symptom resolution rates. The lower symptom resolution rate observed in older individuals may be attributed to chronic conditions or underlying comorbidities, which may complicate their management or require a prolonged recovery period. For example, diabetic patients who are suffering from skin-related minor ailments may have poorer treatment outcomes due to the association between pathological changes induced by diabetes and poor wound healing[31]. Furthermore, there may be limited drug choices for patients susceptible to an increased risk of disease due to other factors, such as gender. For instance, community pharmacists may not recommend the use of non-steroidal anti-inflammatory drugs (NSAIDs) to older males, due to the association between the use of NSAIDs and increased risk of benign prostatic hyperplasia[32]. In addition, this may be due to the limited number of over-the-counter products available to community pharmacists for these patients, who were mainly suffering from musculoskeletal pain. For example, community pharmacists in Hong Kong can offer a limited range of over-the-counter medications, such as ibuprofen and paracetamol, for patients with musculoskeletal pain, based on the local legal classification system, while more potent NSAIDs or analgesics are typically available only by physician prescription[29, 33]. Similarly, most medications used to manage insomnia, such as benzodiazepines and Z-drugs, can only be obtained by prescription after a physician consultation[29, 34]. Therefore, community pharmacists can only offer melatonin or sedating antihistamines such as diphenhydramine to patients suffering from mild insomnia[29, 35]. Similar to CNS symptoms, community pharmacists can offer low-potency topical steroid creams for symptomatic relief of dermatological conditions, whereas high-potency topical steroid creams are prescription-only medicines that require physician consultation[36, 37]. Therefore, managing and resolving CNS and dermatological symptoms may require a multidisciplinary approach due to the complex disease aetiologies and limited treatment options available in the community pharmacy setting.

Our study demonstrated a high level of self-reported patient satisfaction, which was consistent with studies conducted in the United Kingdom and Canada[9, 11, 28, 38]. Similar to the study conducted by Pumtong *et al.* (2021), one of the most positively rated aspects of MAS was the availability of community pharmacists for patients to seek advice or receive treatment[38]. Positive perceptions towards the MAS demonstrate the potential for effectively managing minor ailments in the community pharmacies. Furthermore, patients in our study reported high levels of enablement after using MAS. Compared with other local studies, the mean level of patient enablement reported by patients who have used MAS (6.8 ± 3.2) was similar to that of those who consulted for acute illnesses at Public General Outpatient Clinics (4.1 ± 3.1)[17]. Therefore, these findings highlight the potential of diverting the management of minor ailments from higher-cost healthcare settings to community pharmacies.

Our study found that 13.4% of subjects sought additional care from other healthcare professionals after using MAS. This finding aligns with other studies conducted in the UK (15.1%) and Australia (22%)[7, 9]. Specifically, 8.6% of participants consulted with GPs after using the MAS, which was

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slightly lower than the 15% reported in Australia[7]. This suggests that re-consultation rates for all healthcare practitioners, including GPs, are generally consistent with other studies evaluating MAS in the community pharmacy setting. However, the referral rate (3.5%) was significantly lower than that of the study conducted in Australia (20%) and slightly lower than that of the study conducted in Spain (7.4%)[7, 8]. This may be attributed to the fact that the MAS in these countries typically have predefined referral protocols and well-established communication and referral pathways with other healthcare professionals[7, 8]. In contrast, our study did not have predefined referral protocols, and patients were only advised to consult relevant healthcare professionals at the discretion of community pharmacists[6]. In addition, the lower referral rates in the current study may be due to the fragmented healthcare data-sharing systems and the lack of existing collaborations between healthcare professionals in Hong Kong[39]. Conversely, systems such as the HealthLink platform in Australia enable direct communication between community pharmacists and the patient's GP[7]. Therefore, differences in referral practices may also explain the low referral rate observed in this study.

Due to the current trends in health-seeking behaviour and the lack of established management protocols and referral pathways with other healthcare professionals, most community pharmacies in Hong Kong are currently positioned as retail-oriented businesses[2]. These pharmacies often depend on the sale of general household products, such as toiletries, to serve their local communities and sustain their businesses[2]. In this study, we evaluated the effectiveness of the MAS in NGO-operated community pharmacies, utilising both clinical and patient-reported outcomes. The results of this study appear consistent with those reported in other countries that have already implemented the MAS in their healthcare systems, which suggests that MAS is an effective and adaptable model for managing self-limiting conditions across diverse healthcare settings. Despite the positive outcomes, further development of the scope of practice and the role of community pharmacists will be essential to successfully integrate MAS in Hong Kong.

Since the study was conducted from June to August 2024, it may not fully capture the seasonality of different minor ailments throughout the year. Furthermore, the convenience sampling method may have introduced self-selection bias, self-reporting bias, and sampling bias among participants, as recruited subjects may have been more proactive in seeking MAS and rated the service highly since MAS was provided at no additional cost. Therefore, the results may not be generalisable to those who are less proactive in seeking healthcare. In addition, we also recognise that the relatively short 7-day follow-up period may not be sufficient to capture more severe minor ailments that require longer recovery periods. Although a total of 1,020 subjects had completed the follow-up questionnaire, only 945 cases were successfully linked up in the CPSS, and 719 complete cases, as we have opted to allow participants to select "refuse to answer" or "don't know" for their household income or marital status due to ethical considerations. Despite the shortfall in the complete-case sample size, multiple imputation was used to address the presence of missing data. After multiple imputation, the results of the complete-case regression analyses are generally consistent with the main (imputed) analysis. This study was carried out in NGO-operated community pharmacies, which constitute only a subset of the community pharmacies operating in Hong Kong. Hence, the efficacy of MAS in chain and privately owned community pharmacies should be assessed in future research. In addition, future studies should assess the cost-effectiveness of MAS and any potential seasonal trends in its utilisation throughout the year.

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Conclusion

Our study demonstrated that most patients report feeling satisfied and empowered after using MAS. Although the complete-case sample size was smaller than the planned sample size, our findings suggest that MAS delivery through community pharmacies is effective in managing minor ailments and may help alleviate the burden on higher-cost healthcare settings, such as A&E departments and GP clinics. Moreover, Community pharmacies can serve as the first point of care for minor ailments in the community.

Declarations

Availability of data and materials

Data in this study are available from the corresponding authors upon reasonable request.

Competing interests

Declaration of interest

HHEY reported receiving research grants from the Health Bureau of the Government of the Hong Kong SAR (HMRF) and Viatris, outside the submitted work. EWYC reported receiving grants from the National Natural Science Foundation of China during the conduct of the study; nonfinancial support from Wellcome Trust; grants from Research Grants Council (RGC), Health Bureau of the Government of the Hong Kong SAR (HMRF), National Health and Medical Research Council (Australia), Narcotics Division of the Security Bureau of Hong Kong SAR, Amgen, AstraZeneca, Bayer, Bristol Myers Squibb, Janssen, Pfizer, Takeda, and Novartis; and personal fees from Pfizer, Novartis, and the Hong Kong SAR Hospital Authority, all outside the submitted work. EYFW has received research grants from the Health Bureau, the Hong Kong Research Grants Council, Narcotics Division, Security Bureau, Social Welfare Department, Labour and Welfare Bureau of the Government of the Hong Kong SAR and National Natural Science Foundation of China; serves on member of Core Team for Expert Group on Drug Registration of Pharmacy and Poisons Board, and is the director of Advance Data Analytics for Medical Science (ADAMS) Limited (HK). These are outside the submitted work. I.C.K.W. received research grants from Amgen, Janssen, GSK, Novartis, Pfizer, Bayer and Bristol-Myers Squibb and Takeda, Institute for Health Research in England, European Commission, National Health and Medical Research Council in Australia, The European Union's Seventh Framework Programme for research, technological development, Research Grants Council Hong Kong and Health and Medical Research Fund Hong Kong; consulting fees from IQVIA and World Health Organization; payment for expert testimony for Appeal Court in Hong Kong; serves on advisory committees for Member of Pharmacy and Poisons Board; is a member of the Expert Committee on Clinical Events Assessment Following COVID-19 Immunization; is a member of the Advisory Panel on COVID-19 Vaccines of the Hong Kong Government; is the non-executive director of Jacobson Pharma Corp. Ltd. in Hong Kong; and is the founder and director of Therakind Limited (UK), Advance Data Analytics for Medical Science (ADAMS) Limited (HK) and OCUS Innovation Limited (HK, Ireland and UK). The remaining authors have nothing to disclose.

Authors' contributions

Concept and design by CLC, HHEY, VWSN and EYFW. Funding acquisition by ICKW and EYFW. Statistical analysis by CLC and FNKC. Drafting of the manuscript by CLC, HHEY and VWSN. Critical revision of the manuscript for important intellectual content by JHTS, NHCH,

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RHMM, MTL, THKL, GDC, KKKL, FWTC, ATFH, TFC, EWYC, ICKW and EYFW. Administrative, technical, or material support by EYFW and ICKW. Supervision by EYFW and ICKW. EYFW and ICKW are the guarantors of this work and, as such, had full access to all the data in the study and took responsibility for the integrity of the data and the accuracy of the data analysis.

Acknowledgements
The authors would like to acknowledge the Hong Kong Jockey Club Charities Trust for funding the project. Additionally, the authors would like to thank Professor John Rovers and Professor Cindy Lo Kuen Lam for providing permission to use the Pharmacy Services Questionnaire and Patient Enablement Instrument respectively. We thank all subjects who have joined the study for their time and contribution. Additionally, we would like to thank all participating NGO community pharmacies and community pharmacists for their support in facilitating the recruitment of study subjects. Furthermore, we would also like to acknowledge all support provided by Bachelor of Pharmacy students at the University of Hong Kong. The computations were performed using research computing facilities offered by Information Technology Services at the University of Hong Kong.

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References

1. Dineen-Griffin S, Vargas C, Williams KA, Benrimoj SI, Garcia-Cardenas V. Cost utility of a pharmacist-led minor ailment service compared with usual pharmacist care. *Cost Effectiveness and Resource Allocation* **18**, 24 (2020).

2. So S*, et al.* Primary Care Pharmacy -A Review of Current Situation and Future in Hong Kong. *Hong Kong Pharmaceutical Journal* **31 (1)**, 21–28 (2024).

3. The Government of the Hong Kong Special Administrative Region. LCQ11: Services of the accident and emergency departments of public hospitals. *HKSAR Government Press Releases,* , (2021).

4. The Government of the Hong Kong Special Administrative Region. LCQ22: Services of accident and emergency departments of public hospitals. *HKSAR Government Press Releases,* , (2024).

5. Lee A*, et al.* Factors associated with non-urgent utilization of Accident and Emergency services: a case-control study in Hong Kong. *Soc Sci Med* **51**, 1075–1085 (2000).

6. Lee TK-HC, Gladys Daphne; Law, Kitty Kit-Ki; Lee, Marco Tsun; Wong Ian Chi-Kei. Introduction to Jockey Club PHARM+ Community Medication Service Network Project. *Hong Kong Pharmaceutical Journal* **31**, (2024).

7. Dineen-Griffin S, Benrimoj SI, Rogers K, Williams KA, Garcia-Cardenas V. Cluster randomised controlled trial evaluating the clinical and humanistic impact of a pharmacist-led minor ailment service. *BMJ Qual Saf* **29**, 921–931 (2020).

8. Amador-Fernández N*, et al.* Strengthening patients' triage in community pharmacies: A cluster randomised controlled trial to evaluate the clinical impact of a minor ailment service. *PLOS ONE* **17**, e0275252 (2022).

9. Boag L*, et al.* Public perceptions and experiences of the minor ailment service in community pharmacy in Scotland. *Pharm Pract (Granada)* **19**, 2152 (2021).

10. Rafferty E, Yaghoubi M, Taylor J, Farag M. Costs and savings associated with a pharmacists prescribing for minor ailments program in Saskatchewan. *Cost Eff Resour Alloc* **15**, 3 (2017).

11. Watson MC*, et al.* A cohort study of influences, health outcomes and costs of patients' health-seeking behaviour for minor ailments from primary and emergency care settings. *BMJ Open* **5**, e006261 (2015).

12. Bosse NP, Machado MP, Mistry AP. Efficacy of an over-the-counter intervention follow-up program in community pharmacies. *Journal of the American Pharmacists Association* **52**, 535–540 (2012).

ARTICLE IN PRESS

13. Coelho RB, Costa FA. Impact of pharmaceutical counseling in minor health problems in rural Portugal. *Pharmacy practice* **12**, 451–451 (2014).

14. NHS Education for Scotland. Common Clinical Conditions and Minor Ailments (2016).

15. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *The Lancet* **370**, 1453–1457 (2007).

16. Howie JG, Heaney DJ, Maxwell M, Walker JJ. A comparison of a Patient Enablement Instrument (PEI) against two established satisfaction scales as an outcome measure of primary care consultations. *Family practice* **15**, 165–171 (1998).

17. Lam CL, Yuen NY, Mercer SW, Wong W. A pilot study on the validity and reliability of the Patient Enablement Instrument (PEI) in a Chinese population. *Family Practice* **27**, 395–403 (2010).

18. Tolvanen E, Koskela TH, Kosunen E. Comparison of the Patient Enablement Instrument (PEI) with two single-item measures among Finnish Health care centre patients. *BMC Health Services Research* **19**, 376 (2019).

19. Larson LN, Rovers JP, MacKeigan LD. Patient Satisfaction With Pharmaceutical Care: Update of a Validated Instrument. *Journal of the American Pharmaceutical Association (1996)* **42**, 44–50 (2002).

20. Barlett JE, Kotrlik JW, Higgins CC. Organizational research: Determining appropriate sample size in survey research. *Information technology, learning, and performance journal* **19**, 43 (2001).

21. Census and Statistics Department TGotHKSAR. Table 130-06102 : Statistics on domestic households.) (2025).

22. Census and Statistics Department TGotHKSAR. Quarterly Report on General Household Survey.) (2024).

23. White IR, Royston P, Wood AM. Multiple imputation using chained equations: Issues and guidance for practice. *Stat Med* **30**, 377–399 (2011).

24. O'brien RM. A Caution Regarding Rules of Thumb for Variance Inflation Factors. *Quality & quantity* **41**, 673–690 (2007).

ARTICLE IN PRESS

25. Dineen-Griffin S, Garcia-Cardenas V, Rogers K, Vargas C, Williams KA, Benrimoj SI. *An Australian minor ailments scheme*. University of Technology Sydney (2019).

26. Benzaken T, Oligbu G, Levitan M, Ramdarshan S, Blair M. Community Pharmacy Minor Ailment Service (PMAS): An Untapped Resource for Children and Their Carers. *Pharmacy (Basel)* **9**, (2021).

27. Stämpfli D, Winkler BA, Vilei SB, Burden AM. Assessment of minor health disorders with decision tree-based triage in community pharmacies. *Research in Social and Administrative Pharmacy* **18**, 2867–2873 (2022).

28. Mansell K, Bootsman N, Kuntz A, Taylor J. Evaluating pharmacist prescribing for minor ailments. *International Journal of Pharmacy Practice* **23**, 95–101 (2015).

29. The Pharmaceutical Society of Hong Kong, The Practising Pharmacists Association of Hong Kong, The Society of Hospital Pharmacists of Hong Kong. A Consolidated List of Poisons, Antibiotics and Dangerous Drugs. *Hong Kong Pharmaceutical Journal* **18**, (2011).

30. Paudyal V*, et al.* Are pharmacy-based minor ailment schemes a substitute for other service providers? A systematic review. *Br J Gen Pract* **63**, e472–481 (2013).

31. Dasari N*, et al.* Updates in Diabetic Wound Healing, Inflammation, and Scarring. *Semin Plast Surg* **35**, 153–158 (2021).

32. Nygård LH, Talala K, Taari K, Tammela TLJ, Auvinen A, Murtola TJ. The effect of non-steroidal anti-inflammatory drugs on risk of benign prostatic hyperplasia. *The Prostate* **77**, 1029–1035 (2017).

33. Anekar AA, Hendrix JM, Cascella M. WHO Analgesic Ladder. In: *StatPearls*). StatPearls Publishing (2025).

34. Drug Office DoH, HKSAR,. Oral Sleeping Medicines.) (2012).

35. Morin CM, Buysse DJ, O'Malley PG. Management of Insomnia. *The New England journal of medicine* **391**, 247–258 (2024).

36. Atopic dermatitis in children. *Australian Journal for General Practitioners* **45**, 293–296 (2016).

37. Drug Office DoH, HKSAR, . Drug Database.) (2025).

38. Pumtong S, Boardman HF, Anderson CW. A multi-method evaluation of the Pharmacy First Minor Ailments scheme. *International Journal of Clinical Pharmacy* **33**, 573–581 (2011).

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39. Health Bureau of The Government of the Hong Kong Special Administrative Region. Primary Healthcare Blueprint. (2022).

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Table 1: Subject characteristics

Subject characteristics (N = 1,020)	N (%)
Gender	
Female	702 (68.8)
Male	318 (31.2)
Age	
Mean age (SD)	54.4 (16.8)
18-24	34 (3.3)
25-34	154 (15.1)
35-44	132 (12.9)
45-54	109 (10.7)
55-64	241 (23.6)
≥65	350 (34.3)
Education	
Tertiary Level	426 (41.8)
Secondary Level	435 (42.6)
Primary Level or below	159 (14.7)
Marital Status	
Ever Married	747 (79.0)
Never Married	271 (26.6)
Refused to Answer	2 (0.2)
Household Income (HKD)	
≥$30,000	250 (24.5)
<$30,000	533 (52.3)
Do Not Know or Refuse to Answer	237 (23.2)
Employment Status	
Full-Time, Half-Time/Part-Time	516 (50.6)
Full-Time Student, Home-Maker, Unemployed, Retired	504 (49.4)
Presenting symptoms (N = 945)	
Respiratory System	370 (39.2)
Central Nervous System	285 (30.2)
Dermatological Condition	180 (19.1)
Gastro-Intestinal System	169 (17.9)
Eyes, Ears and Oral Health	92 (9.7)
Infections and Infestations	40 (4.2)
Obstetrics, Gynaecology and Urinary Tract Infections	13 (1.4)
Accessed treatment before using MAS	
Yes	221 (25.6)
No	643 (74.4)

SD: Standard deviation
HKD: Hong Kong Dollar
MAS: Minor Ailment Service

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Table 2: Associations of Subject Characteristics with Pharmacy Services Questionnaire Score, Patient Enablement Instrument Score and Symptom Resolution

	PSQ score (Imputed N=945)		PSQ score (Complete case: N=719)		PEI score* (Imputed N=930)		PEI score* (Complete case: N=707)		Symptom resolution (Imputed N=945)		Symptom resolution (Complete case: N=719)	
	Coefficient (95%CI)	*p*	Coefficient (95%CI)	*p*	Coefficient (95%CI)	*p*	Coefficient (95%CI)	*p*	Odds Ratio (95%CI)	*p*	Odds Ratio (95%CI)	*p*
Age												
18-24	ref		ref		ref		ref		ref		ref	
25-34	0.00 (-0.28, 0.27)	0.983	0.10 (-0.25, 0.45)	0.574	-0.03 (-1.23, 1.18)	0.964	-0.17 (-1.70, 1.37)	0.834	0.94 (0.41, 2.17)	0.886	1.29 (0.45, 3.73)	0.634
35-44	-0.08 (-0.37, 0.21)	0.589	0.05 (-0.31, 0.41)	0.770	0.10 (-1.16, 1.36)	0.877	0.44 (-1.14, 2.03)	0.583	0.60 (0.25, 1.45)	0.253	0.88 (0.29, 2.63)	0.816
45-54	-0.27 (-0.57, 0.02)	0.072	-0.17 (-0.54, 0.19)	0.353	-0.68 (-1.97, 0.61)	0.300	-0.76 (-2.38, 0.86)	0.359	0.32 (0.13, 0.81)	0.016	0.32 (0.10, 1.02)	0.054
55-64	-0.41 (-0.70, -0.13)	0.004	-0.24 (-0.60, 0.11)	0.180	-0.99 (-2.22, 0.24)	0.113	-0.66 (-2.23, 0.92)	0.414	0.25 (0.10, 0.61)	0.002	0.43 (0.14, 1.31)	0.139
≥65	-0.51 (-0.80, -0.22)	<0.001	-0.28 (-0.64, 0.08)	0.131	-1.08 (-2.32, 0.16)	0.089	-0.66 (-2.26, 0.95)	0.423	0.40 (0.16, 0.97)	0.044	0.74 (0.24, 2.31)	0.607
Gender												
Male	0.23 (0.13, 0.33)	<0.001	0.20 (0.08, 0.31)	0.001	0.33 (-0.10, 0.77)	0.130	0.51 (0.02, 1.01)	0.041	1.11 (0.81, 1.53)	0.505	1.12 (0.78, 1.60)	0.554
Female (ref)	ref		ref		ref		ref		ref		ref	
Marital status												
Ever married	0.08 (-0.04, 0.20)	0.194	0.06 (-0.08, 0.20)	0.393	0.14 (-0.40, 0.69)	0.602	-0.22 (-0.85, 0.40)	0.482	1.43 (0.95, 2.15)	0.090	1.20 (0.75, 1.92)	0.446
Never married (ref)	ref		ref		ref		ref		ref		ref	
Education												
Tertiary level	0.05 (-0.12, 0.21)	0.594	0.17 (-0.03, 0.36)	0.090	0.67 (-0.07, 1.41)	0.074	1.03 (0.18, 1.88)	0.017	1.05 (0.59, 1.87)	0.869	1.06 (0.54, 2.07)	0.863
Secondary level	-0.03 (-0.17, 0.11)	0.677	0.08 (-0.08, 0.24)	0.335	0.46 (-0.14, 1.06)	0.130	0.68 (-0.02, 1.38)	0.056	1.13 (0.71, 1.82)	0.606	1.02 (0.58, 1.79)	0.940
Primary level or below (ref)	ref		ref		ref		ref		ref		ref	
Employment status												

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Full-time, Half-time / part-time	0.06 (-0.06, 0.18)	0.354	0.12 (-0.01, 0.26)	0.068	0.22 (-0.30, 0.74)	0.411	0.49 (-0.11, 1.08)	0.108	1.35 (0.91, 2.00)	0.137	1.76 (1.11, 2.78)	0.017
Unemployed, full-time students, retirees, home-makers (ref)	ref		ref		ref		ref		ref		ref	
Household income												
≥$30,000	0.07 (-0.06, 0.19)	0.284	0.07 (-0.06, 0.20)	0.270	-0.24 (-0.79, 0.30)	0.383	-0.29 (-0.86, 0.29)	0.327	1.72 (1.16, 2.56)	0.008	1.87 (1.24, 2.83)	0.003
<$30,000 (ref)	ref		ref		ref		ref		ref		ref	
Prior treatment before using MAS												
Yes	-0.06 (-0.16, 0.05)	0.295	-0.03 (-0.15, 0.09)	0.649	-0.27 (-0.74, 0.19)	0.246	0.05 (-0.49, 0.59)	0.850	0.88 (0.62, 1.24)	0.461	1.05 (0.70, 1.58)	0.815
No (ref)	ref		ref		ref		ref		ref		ref	
Presenting symptoms Respiratory System												
Yes	-0.01 (-0.16, 0.14)	0.907	-0.09 (-0.26, 0.08)	0.309	-0.11 (-0.75, 0.53)	0.737	-0.24 (-1.00, 0.53)	0.542	1.05 (0.61, 1.80)	0.863	1.05 (0.56, 1.98)	0.872
No (ref)	ref		ref		ref		ref		ref		ref	
Central Nervous System												
Yes	-0.11 (-0.26, 0.04)	0.151	-0.24 (-0.42, -0.07)	0.006	-0.98 (-1.63, -0.33)	0.003	-1.18 (-1.97, -0.40)	0.003	0.46 (0.26, 0.81)	0.007	0.45 (0.23, 0.89)	0.021
No (ref)	ref		ref		ref		ref		ref		ref	
Infections and Infestations												
Yes	-0.17 (-0.41, 0.07)	0.162	-0.25 (-0.52, 0.01)	0.064	-0.48 (-1.54, 0.58)	0.377	-0.44 (-1.65, 0.77)	0.479	0.43 (0.17, 1.11)	0.081	0.40 (0.13, 1.19)	0.100
No (ref)	ref		ref		ref		ref		ref		ref	

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Obstetrics, Gynaecology and Urinary Tract Infections												
Yes	-0.03 (-0.44, 0.38)	0.882	-0.32 (-0.82, 0.18)	0.206	-1.31 (-3.08, 0.46)	0.147	-1.81 (-4.00, 0.39)	0.106	0.26 (0.05, 1.36)	0.110	0.37 (0.06, 2.31)	0.287
No (ref)	ref		ref		ref		ref		ref		ref	
Eyes, Ears and Oral Health												
Yes	-0.14 (-0.33, 0.04)	0.128	-0.26 (-0.48, -0.05)	0.016	-0.50 (-1.31, 0.31)	0.226	-1.02 (-1.97, -0.07)	0.035	0.76 (0.39, 1.45)	0.397	0.63 (0.29, 1.38)	0.252
No (ref)	ref		ref		ref		ref		ref		ref	
Dermatological Condition												
Yes	-0.08 (-0.23, 0.08)	0.335	-0.18 (-0.36, 0.00)	0.052	-0.54 (-1.22, 0.14)	0.117	-0.67 (-1.49, 0.15)	0.109	0.54 (0.30, 0.97)	0.040	0.56 (0.28, 1.12)	0.101
No (ref)	ref		ref		ref		ref		ref		ref	
Gastro-Intestinal System												
Yes	-0.05 (-0.22, 0.11)	0.506	-0.16 (-0.35, 0.02)	0.085	-0.99 (-1.70, -0.28)	0.006	-1.08 (-1.92, -0.24)	0.012	0.68 (0.38, 1.23)	0.199	0.68 (0.34, 1.36)	0.280
No (ref)	ref		ref		ref		ref		ref		ref	

CI: Confidence interval
ref: Reference group
*PEI Responses with more than three items answered as 'Not applicable' were excluded.

ED Summary

Cheung, et al. evaluated the effectiveness of a pharmacist-led Minor Ailment Service delivered in community pharmacies in Hong Kong. Findings suggest high levels of symptom resolution rate, patient satisfaction and enablement after using the Minor Ailment Service.

Peer review information: *Communications Medicine* thanks Kung-Chuan Hsu and the other, anonymous, reviewer(s) for their contribution to the peer review of this work.

Figure 1: Study flowchart

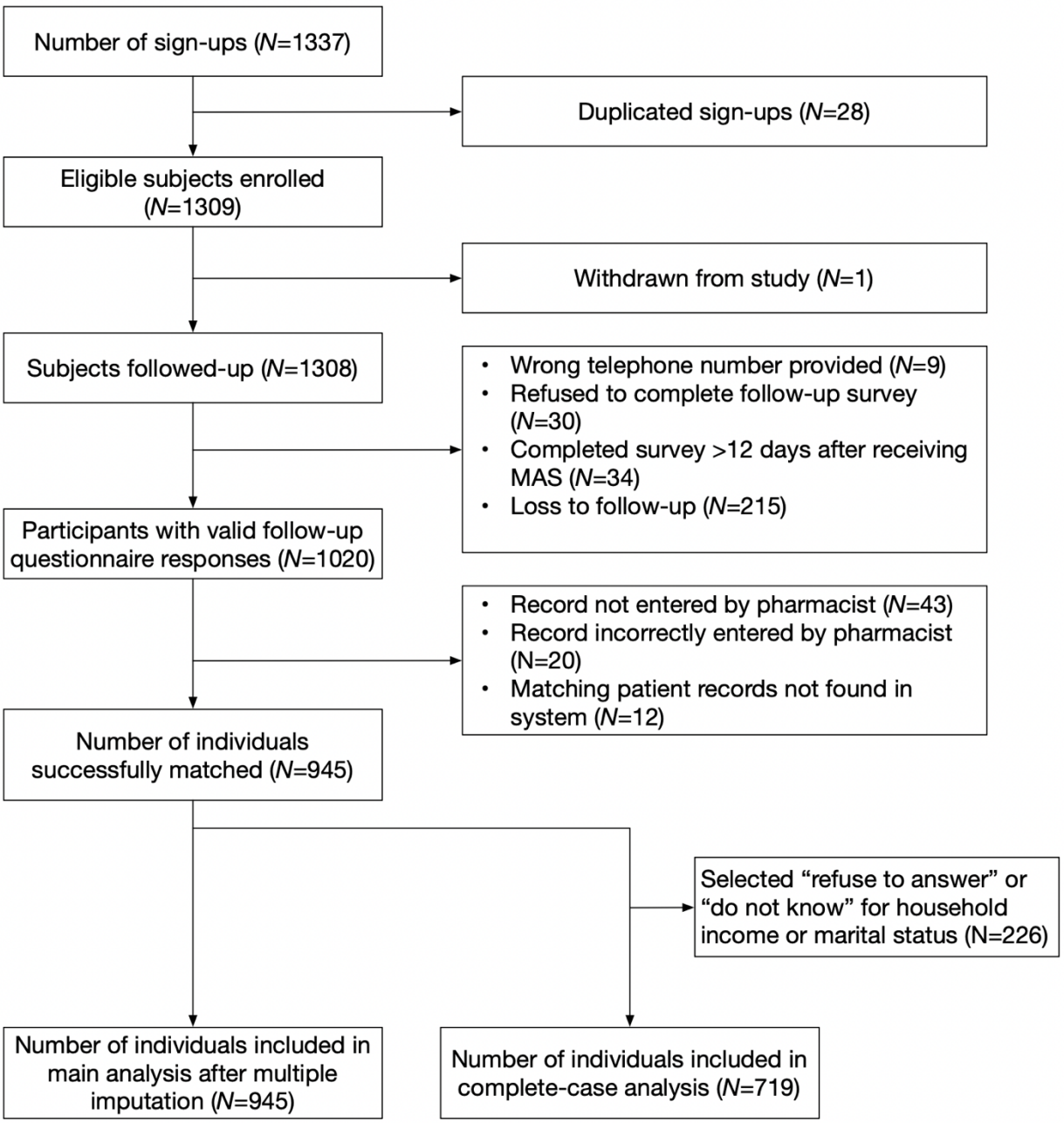

Figure 1: Of 1,337 initial sign-ups, 1,309 eligible subjects were enrolled, with 1,308 completing follow-up; 1,020 provided valid MAS questionnaire responses, leading to 945 successfully matched individuals included in the main analysis and complete-case analysis (n=719).