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## **Accessibility and legibility for elderly in Hong Kong: an empirical study of Chinese typographic cues on prescribed medicine labelling**

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# **Accessibility and legibility for elderly in Hong Kong: an empirical study of Chinese typographic cues on prescribed medicine labelling**

This article follows from the initial stage of a research project that looks at different medicine labels printed by both private clinics and public hospitals in Hong Kong. It examines a number of variables across these labels—typographic cues, information organization and prioritization, visual and spatial presentation. The findings help formulate initial research questions and build solid foundations for a reconsideration of accessibility and legibility of medicine labels designed for members of Hong Kong’s older generation. Moreover, this article shows that, in order to provide medicine and administration information on labels clearly, it is essential to examine the interrelationship between typographic setting, legibility, and accessibility of this information.

Keywords: Chinese typographic cues; elderly; information design; Hong Kong; legibility; medicine labelling

## **Background**

Medicine labels in Hong Kong are strictly regulated. Since 1995, prescriptions and other relevant information must be presented on the bag containing medicine to facilitate proper instruction. Provision No. 38A (1) of chapter 138A of Hong Kong’s Pharmacy and Poisons Ordinance states that “no person shall sell or supply any medicine unless it is labelled with particulars printed so as to be clearly legible in English and Chinese, as to dosage and the route and frequency of administration”. This Provision, however, neither specifies what ‘clearly legible’ means nor elaborates how to achieve optimal legibility by means of typeface, type size, colour and spacing. Such lack of detail in the regulation, in relation to the fact that poor legibility and unclear label design can lead to preventable medication errors, forms the basis for this inquiry into medicine labelling.

Berman (2004) pointed out that, in 1996–1997, 33% of packaging and labelling caused confusion in the United States, by 'lack of prominent placement of drug name', 'small size and poor readability of printed information' and 'poorly designed or cluttered labels'. The Journal of American Medical Association (1995) further stated that 39% of medication errors occurred during patients' administration. A survey conducted by local charitable organization Sik Sik Yuen (2011) on the issue found that nearly 97% of the 569 elderly respondents were dissatisfied with the Hong Kong Hospital Authority's medicine labels, while 96.1% of the respondents (547) requested bigger font sizes for better legibility<sup>1</sup>. However, the suggestion that a simple increase in point size will solve the legibility issue is not convincing. The survey paid less attention to other variables such as typographic and visual cues, which are equally important to the accessibility and legibility of medicine information — especially pertaining to senior members of the Hong Kong society.

### **Legibility and accessibility**

Definitions of legibility vary based on context. In general, the term refers to the ease with which a character can be recognized and read. However, more broadly, legibility concerns a range of factors such as typeface, point size, x-height, number of characters per line, colour, weight and alignment, etc. (Tinker 1965; Spencer 1969; Hartley 1994; Frascara 2006; Waller 2011; Beier 2012). Furthermore, in the Chinese-speaking world, legibility is connected with typeface category, stroke density, stroke length and width, and visual balance of character components, etc. (Chi et al. 2003; Tam 2011; Lee and Moys 2016; Dyson and Suen 2016; Kwok 2016). Considering the above factors, point size is only one of many typographic and visual cues that contribute to legibility.

Increasing point size is also not always feasible within limited label space. Wright (2000) points out that an enlarged point size may not increase accessibility, since it reduces the amount of information in view, which consequently reduces contextual cues available to help comprehension. Accessibility is based on how accurately and easily a user identifies relevant information. In this regard, Frascara and Ruecker (2007) suggest a reconsideration of information design for effective accessing of medicine information, by sorting it into related groups. On another note, Rubin and Chisnell (2008) state that accessible design should be tailor-made to fulfil the need for clarification — especially for the elderly. It is therefore essential to explore typographic cues beyond those in use in local labels, and take into consideration the interrelationship between typographic cues, accessibility and legibility of medicine information.

### **Mapping out medicine labels**

To understand typographic cues as presented in medicine labels in Hong Kong, 17 different medicine labels were examined. Specifically, four were collected from public hospitals, seven from private clinics, and three from semi-private hospitals/clinics. Each label was photo-documented and all content presented on the labels was recorded and classified based on the nature of information (See for example Table 1). In addition, typographic cues in the labels were documented in an inventory list. Typographic cues were divided into different variables, for example, San-serif and serif fonts, upper and lower cases, bold and regular styles, and three Chinese typefaces, etc. (See for example Table 2).

### **Medical information**

This section focuses on mapping out the presented information in Hong Kong's medicine labels in public hospitals (Figure 1) and private clinics (Figure 2).

### ***Clinic/hospital information***

In this category, different items were found across all labels (Table 1). Clinic information such as doctors' names, professional qualifications, contact numbers, and clinic addresses, are prioritised in labels from private institutions, which is visually achieved through the use of font size, font weight, and spatial arrangement. For example, doctors' names and contact numbers are often placed at the top, drawing most attention (Figure 2). In contrast, labels from public hospitals feature institution names less prominently (Figure 1), perhaps because they are government-managed. Patient information, medicine information, and precaution information are prioritised in these labels, while both doctors' names and contact numbers are absent.

### ***Patient information***

In labels from both public and private hospital/clinics, patients' full names in Chinese, and their registration numbers are shown. Very little other personal information is found, which may be due to Hong Kong's high sensitivity towards patient privacy.

### ***Medicine information***

Medicine information is a key element in medicine administration to instruct patients on correct drug usage. Seven relevant items were found on the labels: Dispense date, method of administration, drug function, drug quantity, drug name, dosage, and drug type. The first four are in Chinese, while the remaining are in English. Dispense date is found in all labels and is important in light of expiry and as a reminder of the time of prescription. A list of symptoms, drug function and drug administration information are pre-printed on the issued grip seal bag. It is not unusual for private clinics to present

common medicine information in this convenient way. Pre-printed messages, usually with checkboxes, includes information about common symptoms such as fever and headache. Doctors simply check respective boxes to indicate drug features, saving on processing time.

### ***Precaution information***

Analysis from the mapping showed precaution information is presented prominently on labels from public hospitals, and with varying levels of importance, based on the nature of information. The first line of message applies to universal precautions such as 'keep out of reach of children'. The second line addresses side effects and drug attributes, such as 'may cause drowsiness'. Precaution information is less often presented in labels from private clinics, which is due to the fact that patients are verbally informed of drug administration and precautions before they leave the clinics.

To conclude, information organisation in the studied medicine labels is determined by the institutions' priorities, and strategically presented using both visual and typographic cues. For example, on labels from private institutions, both clinic names and professional qualifications are in bold and highlighted with larger point sizes, whereas labels from public hospitals put precaution information first, serving public interest. Seven to ten items of medicine instruction are presented, yet not many typographic cues are employed to facilitate clear identification. Therefore, there is room for improvement when it comes to the legibility and accessibility of medicine information on labels.

### **Typographic cues**

#### ***Chinese typefaces***

All information in Hong Kong medicine labels is primarily presented in Chinese, supplemented with some English. The studied labels make use of three common Chinese typefaces (Table 2) — SongTi (similar to Latin Serif), KaiTi (similar to Latin Script), and HeiTi (similar to Sans serif). SongTi is commonly used in labels from private institutions, specifically for information about clinics, patients, medicine, and precautions. SongTi is also more commonly used to present medicine information, specifically method of administration, drug function, and drug quantity. Public hospitals seem to prefer KaiTi fonts, which is used for information about medicine and precautions. Only three private clinics use HeiTi in their labels, for both medicine and clinic information, making it the least applied among the typefaces.

### ***Serif and Sans-serif fonts***

When looking at Roman serif fonts in the mapping list, it becomes apparent that they are largely applied to medicine information. Serif fonts are used for drug names, dosages, dispense dates, and drug types, in labels from both public and private clinics, most possibly since names of Western drugs are often in English. However, no serif fonts are used for precautions as these are all in Chinese. Sans-serif fonts are used in clinic information, patient information, and medicine information. In comparison to public hospitals, private and semi-private hospitals and clinics make more use of sans-serif fonts in their labels.

### ***Capitals, upper and lower cases***

Capital letters are the most common typographic cues used for medicine, and can be found in all 17 labels. For example, drug names, dosages, and drug types are often capitalised (Figure 1). Drug names consistently come first, while dosages and drug

types are occasionally swapped. Such information is written in the following ways: ‘LORATADINE 10MG TABLET’, ‘NUROFEN 200MG’, or ‘VALSARTAN TABLET 160 MG’.

Upper and lower cases are much less used in medicine labels. When used, they mainly present medicine information. Some clinic information is written in upper and lower cases, specifically clinic names and contact numbers. Despite their minimal usage in Hong Kong medicine labels, upper and lower cases are in fact considered highly legible — more so than all capitals. The question is therefore why they are rarely applied in medicine labels.

To conclude this section, different typographic cues are used in the 17 studied labels. Chinese typefaces SongTi and KaiTi are commonly used in medicine labels. HeiTi is used to present information about the clinics themselves but rarely anything else. For English information, interestingly, public hospitals tend to use serif fonts while private clinics tend to use sans-serif ones. All capital letters are usually used for drug names and dosages, while upper and lower cases are used much less, despite the fact that they are considered more legible. Besides the aforementioned items, rarely any other typographic cues — e.g. font weight, underlining, and indents — are used in current labels. Further research should focus on the potential of such typographic cues in improving Hong Kong medicine labels.

## **Hypotheses**

An increase of font sizes in compact medicine labels is seemingly impractical and will not necessarily improve accessibility and legibility. Other typographic adjustments



could be considered for better performance. The following hypotheses will be tested in future research:

1. Information reorganisation and prioritisation based on users' needs will lead to greater improvement of accessibility than a mere increase of font sizes.
2. A reconsideration of typographic cues used to present information in small spaces will lead to greater improvement of legibility in labels than a mere increase of font sizes.

## **Methodology**

This further research will be executed in two phases:

1. Problem identification of the current medicine labels and medicine label selection
2. Usability tests

### ***Phase 1. Problem identification of current medicine labels and medicine label selection***

1.1 Focus groups. The aim of the focus groups is to find out what understanding elderly people have of the information presented on current medicine labels, and to get a sense of the labels' accessibility and legibility. In group discussions, elderly participants' comments on current medicine labels will be gathered for the researcher's understanding of the obstacles they encounter in the information retrieval process, and to explore how they use the label format.

1.2 Medicine label selection. The medicine label selection session will be held after the aforementioned group discussion. A range of different label formats will be presented, featuring diverse typographic cues and information reprioritisation, but sharing the same size and types of content as the current labels. The proposed labels will be presented on a single A4 sheet and displayed alongside the originals, which functions as a reference to the original content and design structure. The proposed formats are expected to probe further discussion, so that preferred typographic cues and information reprioritisation can be understood in light of legibility and accessibility of information in small spaces.

Both the focus group and the discussions about alternative table designs will provide a background to — and a baseline for — the measurement of accessibility and legibility in medicine labels. They will inform the development of new medicine labels that can respond to users' perspectives and be tailored to their needs in medicine administration. The proposed labels will be further refined and tested in collaboration with individual elderly participants in the second phase of the study — with a series of usability tests (Phase Two).

### ***Phase 2. Usability tests***

Phase Two will focus on usability testing, examining how information can be best presented on the revised medicine labels to achieve optimal legibility and accessibility..

#### 2.1 Comprehension test

The usability tests will be conducted following a set of questions developed by Sless and Wiseman (1994), which have been used as comprehensive indicators for medicine

information (Rogers et al., 1995). The set of questions could help understand accessibility and legibility of designs from the end-user's point of view — to see if the user would find, understand, and act on certain information appropriately.

## 2.2 Satisfaction and performance rating

Each participant will be asked to perform search tasks on the revised labels. Searching time and number of errors will be recorded. Afterwards, participants will be asked to indicate their levels of satisfaction with regard to the overall performance of the revised medicine labels.

## **Impact**

In response to the global rise of ageing populations, The World Health Organization launched the Global Age-friendly Cities Guide (2007) that specifically mentioned medicine labels, stating that information for older people should be accessible, and easy to read and understand. Today in Hong Kong, although demands concerning medicine information have been increasing due to rising awareness in patient rights, design has rarely been considered to cope with information accessibility and legibility, especially for senior citizens.

In the long term, this project's initial findings will form a foundation upon which gradual improvements of the entire medicine label system, including drug prescription and medicine administration, will be based. This in turn could improve local healthcare service regimes, increase elderly citizens' level of independency and support the development of an elderly-centric city in Hong Kong.

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## Images

Figure 1. A label from a public hospital, 101mm (W) x 51mm (H). Printed at the moment medicine is dispensed.

1. Universal precaution
2. Drug name and dosage (English)
3. Method of administration
4. Drug function
5. Drug precautions, side effects
6. Patient name
7. Institution name
8. Codes for internal use
9. Dispense date

Figure 2. A private clinic's label, 63mm (w) x 83mm (h). Note that small labels from private clinics normally combine pre-printing with hand annotation.

1. Doctor's name and qualifications (Chinese)
2. Doctor's name and qualifications (English)
3. Clinic address
4. Contact number
5. Patient name
6. Dispense date
7. Method of administration (Chinese)
8. Drug functions
9. Drug precautions, side effects
10. Method of administration (English)
11. Drug name
12. Dosage

## Tables

Table 1. Clinic/hospital information on three types of labels.

Table 2. Three common Chinese typefaces used across three types of labels.

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<sup>i</sup> The survey was conducted by the Sik Sik Yuen Ho Kin District Community Centre for Senior Citizens, a non-governmental organization, in seven communities in Hong Kong from November to December 2010. There were 928 respondents in total, including 569 older people and 359 others.