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Life and Medication - Needs for Packaging and Devices

			
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ABSTRACT

Providing sustainable medical care is a priority issue throughout the world. One key issue is the appropriate delivery of drugs for all ages. In addition to drug innovation, packaging innovation is a key aspect of quality health care, cost-effective drug therapy and community care. However, the need to focus on drug packaging and devices is not generally understood. Additional practical studies and proposals are necessary for development of drug packages for safe use by all ages. So innovation for effective drug distribution with suitable packaging and devices focusing on usability has become a major need for medical services in all countries. Since Japan is the country with the highest proportion of aged in its population, it is a model for sustainable medical care with universal health coverage. This study assesses the usage of drug packaging and devices based primarily on past studies and public information for Japan. Necessary drug packaging and devices is summarized and mapped taking into account age and social needs.



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INTRODUCTION

We are facing the issue of aging societies throughout the world, which means fewer young adults will support larger numbers of elderly people. It is estimated that around 29.1% of Japan's population will be over 65 in 2020; this directly affects medical care expenditures¹. Self-medication and community-based care are being encouraged in medical care policy. This increases opportunities for patient responsibility for drug and device use. For appropriate self-medication from children to the elderly in the community setting, we have to seriously think about the safety in use, this includes clear labeling and high usability of drug packaging and medical care devices. From a risk management point of view, the role of packaging and devices is important as reflected in the many guidelines and regulations in the United States and other countries². Without appropriate drug packaging, high-quality drugs and devices do not work well. This means that good packaging and devices are equally as important as the quality of drugs and good medical care for all ages. From the data for medical care costs, the amount of drugs sold and the age of users provide suggestions for future directions for packaging.

MATERIALS AND METHODS

Although information and instruction are provided to users on how to use drugs and devices, there have been very few reviews on how the use of drugs depends on the age and background of users. Thus, it is important to study the needs of drug users that relate to packaging and devices in order to develop better drug packages and devices.

Given these issues, this study analyzes the status of current medical care and drug use including consumer age, dosage form, types of packaging and devices in relation to the ongoing socio-economic transition. Directions for developing better drug packages and devices in the near future are considered.

Data of on user age, drug use situation including consumption of drugs, type of drugs and trends for drug packaging was analyzed from past studies and public information. Necessary drug package and devices were mapped considering age and social needs.

CONCLUSION

Consumption of Drugs in Japan

To assess trends in consumption of drugs, we collected several types of public data. Fig. 1 shows the overall factors that affect health care expenditures³. While there are several factors, however, aging is the most significant factor affecting health care spending in Japan. Fig. 2 shows the expenditure on health care per capita, the rank of Japan is similar to the UK, Iceland and New Zealand⁴ and slightly lower than the average for the OECD34. On the other hand, looking at the expenditures on pharmaceuticals per capita, Japan has the second largest expenditures in the world after the US (Fig. 3)⁵. This means that the share of drug cost is extremely large within health expenditure compared to other OECD countries and Fig. 4 shows the cost by form of drugs that are consumed in Japan. The share of tablets is about half of the cost of drugs in Japan, followed by capsules and powders⁶.

Thus, there is a high demand for packaging for tablets and capsules with a large proportion of this packaging being used by the elderly⁷.

Trends and status of drug users in Japan

Fig. 5 shows that per capita health care expenditures is highest for later-stage elderly (persons over 75 years old)⁸ and the proportion of the population over 65 years old will continue to increase in the near future (Fig. 6)⁹. This also means that the elderly are the highly highest users of drugs. On the other hand, there is the increasing trend for the rate of visits to medical institution by children for all area of health care including hospitals, clinics and dental clinics. This means that more children are consuming drugs and using medical devices. In addition, the increasing proportion of the elderly in the near future means that the demand for high usability drug packages will increase (Fig. 6)¹⁰.

Drug use situation and social background

Government data shows that typical errors related to medication include prescription, transcription, dispensing and administration; all of the types of errors may be related to drug packaging and devices¹¹⁻¹³. Japanese data shows that there are many drug related accidents, particularly for children and the elderly. From the Japanese data, there are a lot of accidental problems of drug related things, particularly children and the elderly. As

medication-related accidents are a large portion of children's swallowing accidents (Table 1) ¹⁴, the United States and EU countries have issued guidelines for Child Resistant Packaging (CR), and there are the needs for Japanese guidelines for CR drug packaging ¹⁵⁻¹⁶. The types of accidents for the elderly are different with many reports of accidental ingestion of packages with tablets. Since about half of drug products sold in Japan are tablets and capsules packaged in Press through Packages (PTP), usability and avoiding accidental ingestion of packages are key issues for packaging ¹⁷⁻¹⁸. If usage in the community setting were to be investigated, it is possible that a wide range of issues associated with the aging society might be identified ¹⁹.

Generic drugs and over the counter (OTC) drugs

Throughout the world, there is the issue of generic drugs. Fig. 7 shows the ranking for use of generic drugs in the world ²⁰. It is clear that Japan uses less generic drugs than most western countries. However, policy of Japanese government is clear, it is to encourage the use of generic drugs for cost-effective care. Generic drug companies have strategies to make high usability drugs including packaging and types of drugs. Thus, better packaging will have additional value in the competition for drug sales ²¹. As for OTC drugs, the share of sales is relatively low (Fig. 3). However, as Japanese total expenditure for drugs is the second highest in the world, OTC drugs are an important market for pharmaceutical companies. In addition, as the government is encouraging switching from prescription drugs to OTC, the number of prescription drugs being approved as OTC drugs is increasing ²². Increasing OTC drugs also encourage self-medication in the community ²³. Thus drug packaging and device designs should become more integrated into design, color, and usability with the concepts of universal design and safe use.

Needs for drug packaging and devices

From the above multiple trends, the role of packaging and devices is becoming more and more important in therapy and care. Japanese government strongly supports the policy of integrated community care for sustainable medical care and patient support. It means that we need to understand multiple areas of need in medical care from highly specialized care to self-medication. Drug packaging plays an important role in every scene of medicine. Several areas of needs for packaging and devices are indicated below.

1. Drug for dementia
2. DM patients and self-injection
3. Drug for rheumatoid arthritis
4. Devices for asthma
5. Nasal Devices
6. Drugs for Influenza
7. Drugs for the elderly
8. Drug adherence support

Drugs use by dementia patients has been highlighted as requiring research to address multiple issues. Since the number of patients is increasing who have problems with everyday life. Compliance with drug usage regimes is a serious issue for patients with dementia. It is important to develop high usability drug packages and means for checking compliance with drug usage regimes²⁴.

The number of lifestyle-related diseases including type 2 diabetes mellitus (DM) is rapidly increasing. Thus, the number of patients who need self-injection is also increasing. Since DM patients need self-injection every day, safety and high usability are essential for patients from children to the elderly. A previous study indicated the importance of these devices, which need evaluation for use by both medical personnel and the patients themselves²⁵.

Rheumatoid arthritis is a common disease; patients suffer not only pain but also deformity of joints. Recently, self-injection therapy has become very popular around the world. It means that users with disability need to perform self-injection for their therapy. Thus devices and support devices are required to enable them to use injection devices²⁶.

Asthma is very common disease for all ages. The guidelines for therapy describe the importance of inhalation in the early stage of an attack. There are variety of devices that depend on the drugs and their nature. Practical education for patients on device use is important as is manufacturing high usability devices²⁷.

Recently nasal delivery of drugs has attracted attention due to low invasiveness, not only for traditional therapies such as for allergies but for use in treating other diseases. So various types of devices are necessary for appropriate therapy and self-use in all ages²⁸.

Influenza is one of the most serious infectious diseases throughout the world. It affects not only individuals but also all areas and even other nations. So prevention, diagnosis and therapy are equally important. Recently various drugs have been developed, some of which require devices. Since users of such devices include children and the elderly, safe use of such devices is necessary²⁹.

The most common users of drugs are the elderly; they take a number of drugs every day to maintain their health. However, the elderly have complex problems including physical and mental issues. Easy to take forms of pharmaceutical products and appropriate packages are equally important. Even when high-quality drugs are prescribed, poor adherence can lead to unfavorable results. Observing drug taking regimes is a serious matter and drug packages have an important role in safe and effective therapy³⁰⁻³¹.

There have been a lot of reports and discussion on how to check drug taking³² as obtaining better adherence to drug treatment regimes is important for effective therapy. Furthermore, considering cost-effectiveness of medical care, the issue of adherence affects the social economy of any country. There are many reports that show that the rate of adherence for all diseases is around 50%. So ideas for support that increase adherence is a serious issue not only for medical outcomes but also for cost-effective medical expenditure in an aging society. There is a high demand for sustainable support ideas, devices and systems.

Summary

To deliver secure and safe medical care for all generations, we have pay attention to drug packaging and devices. Without high usability products, effective and sustainable care in the community setting is not possible. Considering areas for future study and appropriate distribution of drug package and devices, we summarized the current situation for drug use and areas for attention based on current evidence (Fig. 8). As the development of medicine and drug therapy options increase, it means that more users will face various drugs and devices. So the study and evaluation of drug packaging must be addressed

seriously. In some senses, drug packaging and devices play an equally important role as quality of drugs.

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HUMAN

FIGURES

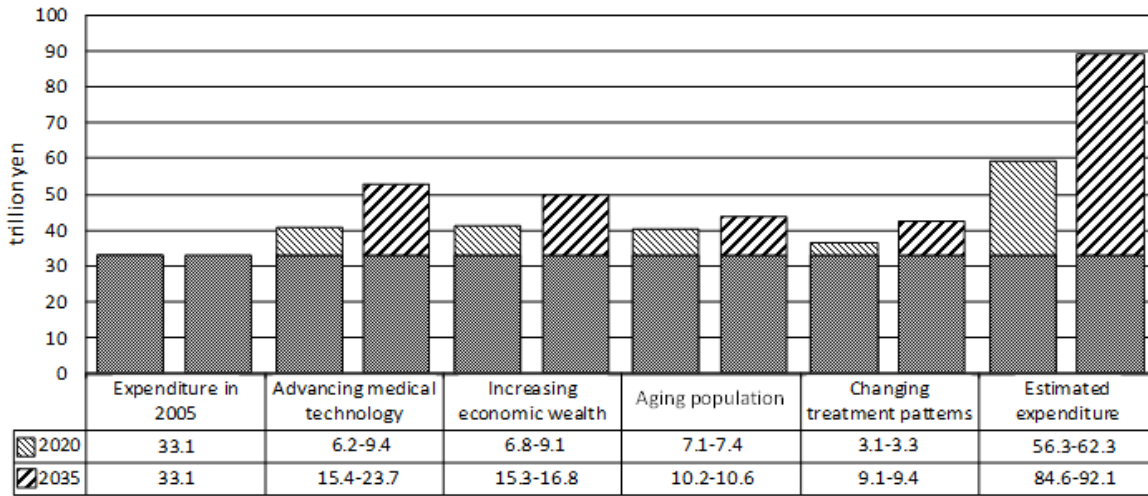


Fig.1 Four factors influencing projected increase in Japan’s health care spending through 2035

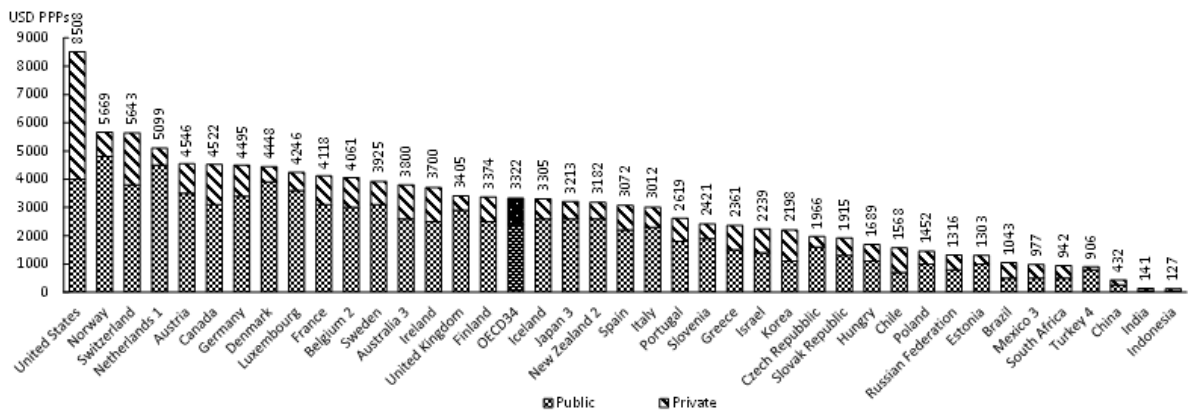


Fig. 2 Health care expenditures per capita, 2011 (or nearest year)

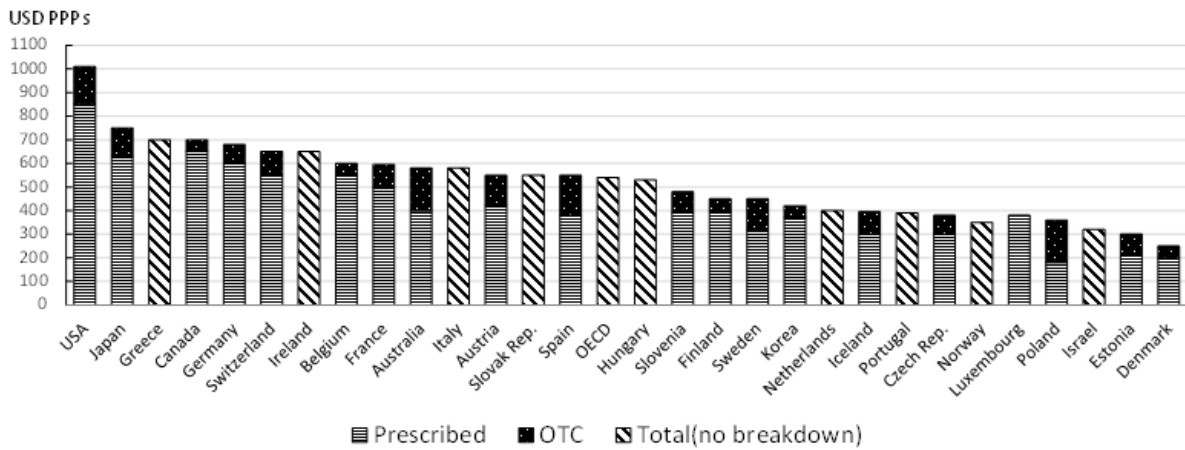


Fig.3 Expenditure on pharmaceuticals per capita, 2013 (or nearest) (OECD Health at a glance 2015)

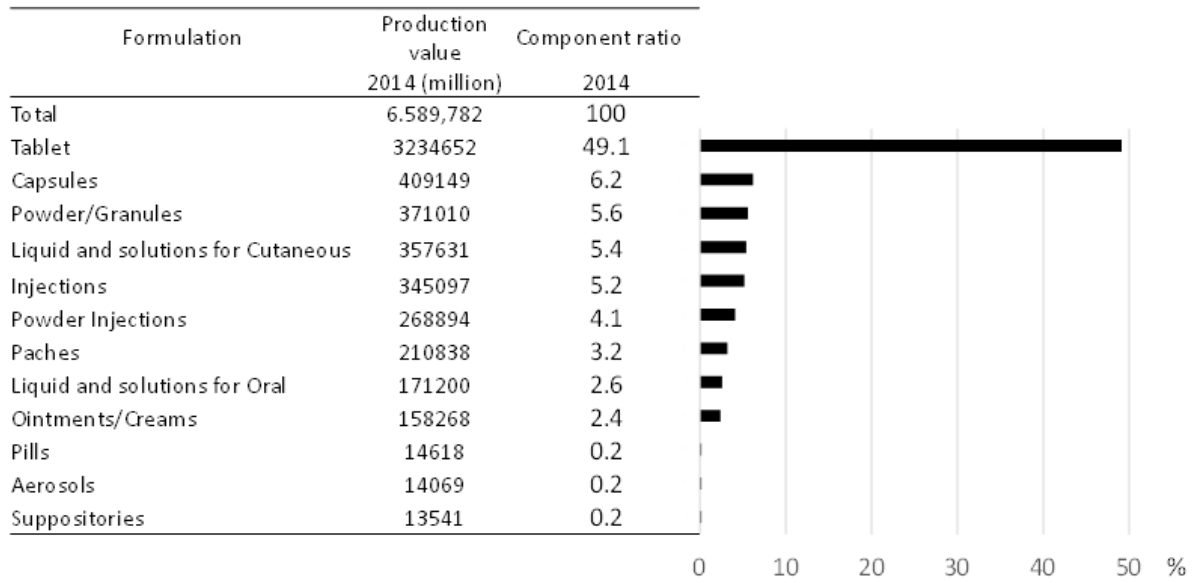


Fig.4 Formulation and share of products

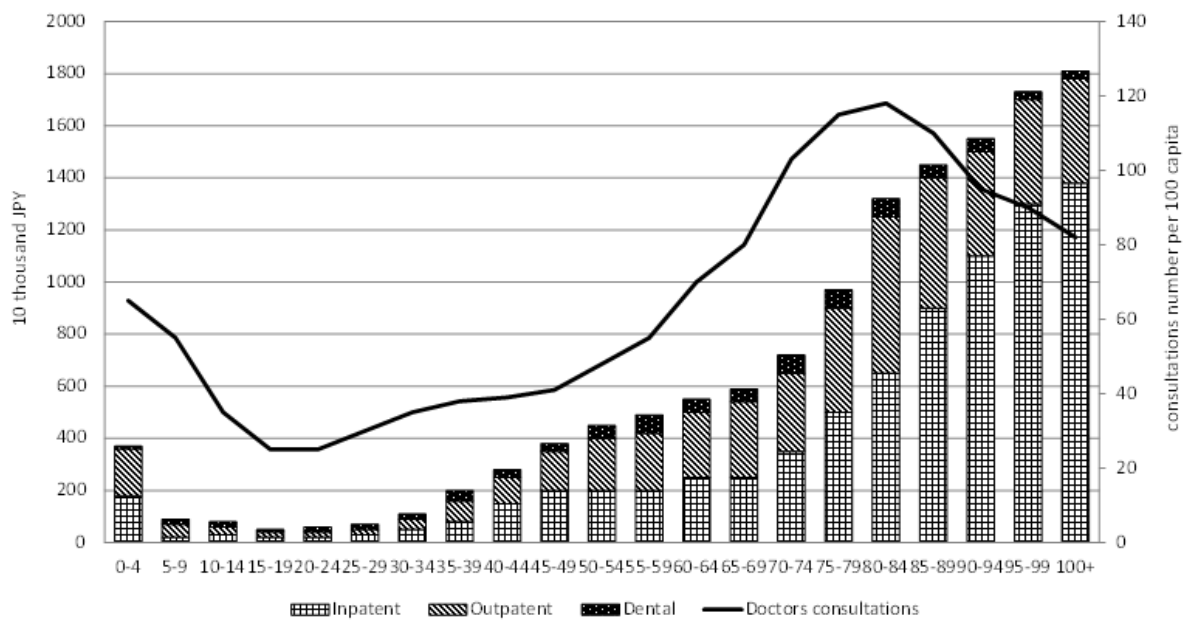


Fig.5 Health care expenditure in Japan and Latter-Stage Elderly Healthcare by Age

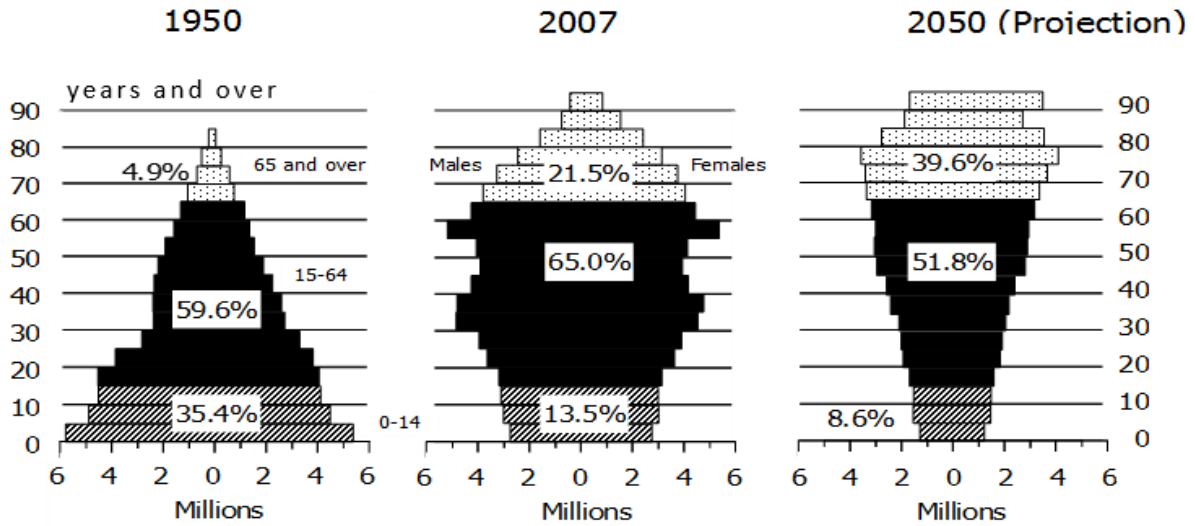


Fig.6 Distribution of population

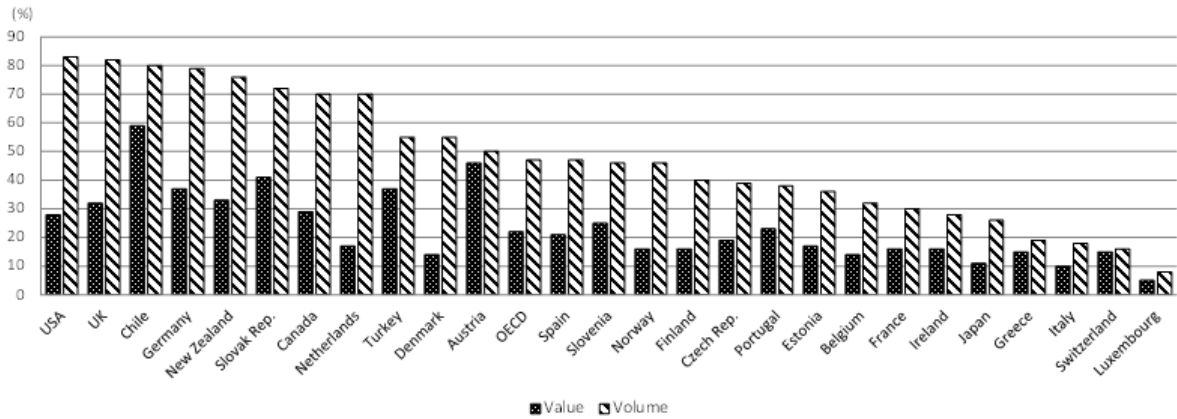


Fig. 7 Share of generic drugs in the total pharmaceutical market, 2013 (or nearest) (OECD Health at a glance 2015)

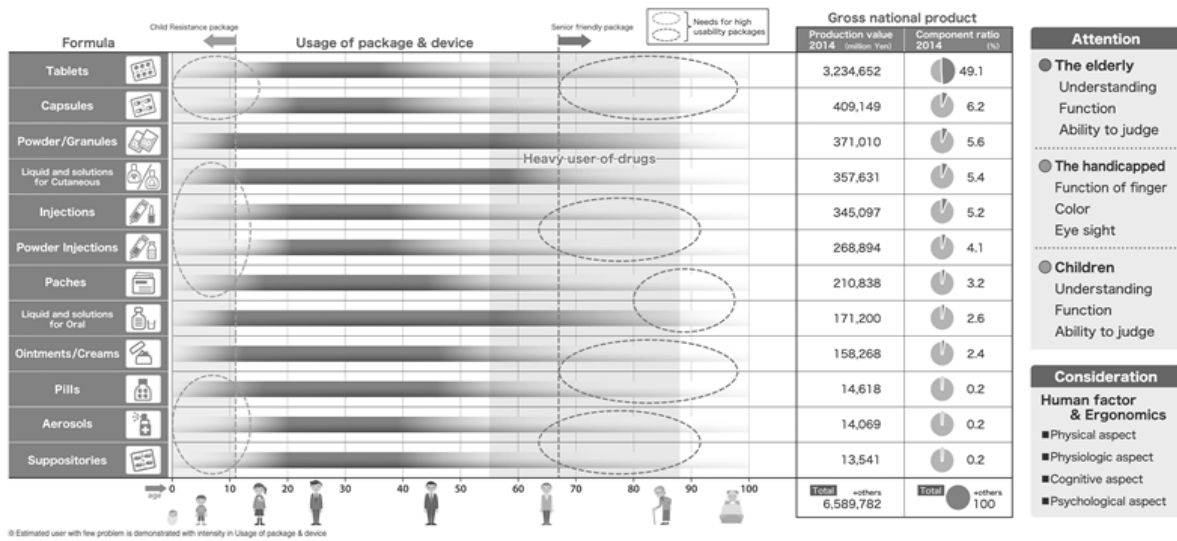


Fig.8 Life & Medication

Table 1 Accidental swallowing by children

Drugs and quasi-Drugs	18.1%
Tabaco	17.1%
Plastic products	11.30%
Toy	9.60%
Metal products	9.40%
Coin	4.70%
Battery	3.80%
Foods	3.60%
Cosmetics	3.20%
Detergent	3%

