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INST FÖR SPRÅK OCH LITTERATURER

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A Lexical Analysis of Contemporary Medical Terms in Japanese

Li Jin Yang

Handledare:
Yasuko Nagano-Madsen
Examinator:
Martin Nordeborg

Abstract

Medical terminology is an important subset to any language, and completely indispensable to oral and written communication in healthcare related professions. There is also a known divide between technical medical vocabulary used by medical professionals and general medical vocabulary that is easily understood by non-professionals and seen more frequently in everyday use. Though there has been a significant amount of research performed on its various aspects, to my knowledge no qualitative analysis has yet been performed on the vocabulary types present in medical terminology. The use of various vocabulary types are said to differ greatly in Japanese depending on context. Newspapers and academic writing are dominated by Sino-Japanese, daily conversation by native Japanese, while foreign loanwords can be found more frequently in women's magazines[1]. The present study applies a framework of Japanese vocabulary types proposed by Yamaguchi (2007) onto medical vocabulary collected from *Katei no Igaku* (2000), a medical guidebook for home use. 266 terms were arbitrarily extracted and classified in native Japanese, Sino-Japanese, foreign loanwords, hybrids, abbreviations and acronyms. A selection of terms were then further analyzed with reference to the semantic relation between the component morphemes. The results indicate that written medical language is dominated by Sino-Japanese vocabulary, but the percentage constituency of vocabulary types in medical vocabulary may vary greatly depending on secondary parameters such as word category constituency and whether the text is intended for a professional or non-professional reader base. Yamaguchi's framework for the classification of two character nominal compounds was modified for the subsequent analysis of Sino-Japanese vocabulary, due to the significant presence of vocabulary composed of more than two characters. It was determined that the most frequently found compound structure was of elements that act as modifiers, while compounds with elements in repetition or opposition were entirely absent. The presence of large quantities of nominal compounds in the present study suggests that they are a central component in medical terminology and not necessarily inaccessible to non-professional readers.

Romanization Conventions

The romanization of Japanese in this thesis is performed using the modified Hepburn system. Japanese names are written in conformity with western naming conventions, given name before surname.

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1 Yamaguchi, Toshiko (2007) *Japanese Linguistics: An Introduction* p. 59

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1. Introduction

Japanese and medicine have been my two main fields of study during the past three years, and it seemed natural for me to attempt to combine the two for my Bachelor's thesis in the former. In the early stages of medical studies, much time and emphasis is placed on the acquisition of correct terminology, not unlike learning the basic vocabulary of a new language. In fact, a significant portion of the curriculum for a medical student during both the pre-clinical and clinical years involve rote memorization of terms ranging from fields such as anatomy, biology, physiology and pharmacology, not to mention the names of pathological conditions and clinical jargon ranging from procedures to equipment. Naturally, as a part of the progression of my Japanese studies it gradually became necessary for me to be able to describe aspects of my daily life including my medical studies in greater detail in the Japanese language, and this became the starting point for my interest in medical terminology in Japanese.

There are a number of inherent qualities of medical terminology that I felt made it an interesting subject for analysis. Like many other sets of terminology in specialized fields, it contains a large quantity of terms that are highly precise and descriptive, and is generally only used in written form or by professionals working in healthcare. However, there is also an oral didactic component to medical language due to the necessity for efficient doctor-patient communication, and in many cases there are more easily comprehensible synonymous terms or phrases that can be found in parallel to the technical terms. Examples of pairs of terms with this relationship are: 痙攣 *keiren*, 'convulsions, cramps' and 引き付け *hikitsuke*, 'convulsions', 嚥下する *enge-suru*, 'swallowing, deglutition' and 飲み込む *nomikomu*, 'to gulp down, to swallow deeply' where the former in each pair is a technical term and the latter a word more frequently seen in everyday life and outside of a medical context.

I felt that this range of available vocabulary is a characteristic that I would like to examine more in-depth, particularly in the Japanese language where there are subgroups present that are distinguished by factors such as the character system used in the written form, the reading, and the origin of the words. One of the main divisions in the vocabulary, between native Japanese words and Sino-Japanese words defines two separate groups where the former native terminology is seen frequently in everyday use and the latter being words that are often compounds of *kanji* characters and are noted for their usage where a greater degree of descriptive accuracy is required. In the examples above, both technical terms were examples of Sino-Japanese while their corresponding synonyms were native Japanese.

These groups of vocabulary, otherwise known as the strata of Japanese, have been well established and categorized in previous studies of Japanese linguistics by among others Yamaguchi (2007). As the topic of study for my thesis, I have chosen to investigate the usage of these types of vocabulary in Japanese medical terminology, an aspect of the Japanese language that is an essential element to the acquisition of medical information and data that has nevertheless only been studied to a limited extent from a linguistic perspective.

2. Previous Research

Medical terminology has as an undeniably important role in oral and written communication in healthcare related professions, where precision can be essential to the well-being of the patients involved. There are a number of existing studies that tackle various aspects of this vocabulary group at present.

As the sole example to my knowledge of a quantitative study of the lexicon in medical terminology, Kimu, E Ran, Kiryū, Rika et al. (2008) published a paper showing an alternative approach to the analysis of medical vocabulary as an example of technical terminology analysis[2]. Through the creation of a corpus based on the extraction of words from digital publications targeting laymen and healthcare professionals, data were collected and sorted through an algorithm to be classified based on parameters such as vocabulary type. The results of this study contained useful reference quantitative data for the division of medical terms based on five vocabulary strata classification model where the five types were Sino-Japanese, foreign loanwords, hybrids, native Japanese terms and acronyms. The results also show preliminarily that there are differences between vocabulary types between vocabulary of a more technical nature when compared to general medical vocabulary, but this has not been further discussed or followed up with qualitative analysis in the study.

The fact that there is a general communication difficulty involved in the usage of medical vocabulary, particularly between laymen and healthcare professionals, have not gone unrecognized. In an attempt to address these difficulties, the National Institute for Japanese Language (国立国語研究所) has produced a proposal for the simplification of the language used within hospitals[3],

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2 Kimu, E Ran, Kiryū, Rika et al. (2008) *Ippanmuke senmon'yōgo chūshutsu no kokoromi: iryōyōgo wo rei ni* [Technical vocabulary for the general public, an attempt at extraction: medical terminology as an example]

3 National Institute for Japanese Language Committee for 'Hospital Language' *Byōin no kotoba wo wakariyasuku suru teian* [A proposal for the simplification of 'hospital language'], (2009)

where a selection of the most poorly understood, poorly recognized and easily misunderstood terminology has been determined based on surveys, and directives and guidelines for the facilitation of patient understanding through simplified means of expression. Data from this report shows that among the twenty medical terms determined to be recognized by the fewest individuals tested, seven were acronyms (such as DIC, disseminated intravascular coagulation and COPD, chronic obstructive pulmonary disease), six were Sino-Japanese terminology, six were foreign loanwords and one were a native-Japanese and Sino-Japanese hybrid.

Mika Hashimoto et al. carried out a study on the *kanji* and technical terms from the field of medicine and how well healthcare students were able to read them correctly in 2007-2008. Using a list of sixty Sino-Japanese technical terms for the survey-based study, Hashimoto et al. obtained results that indicated significant inadequacies in the reading ability of the students lies partially in the difficulty selecting a correct *on'yomi* out of the multiple available options but also that students in general performed poorly at distinguishing between *on'yomi* and *kun'yomi*, and did not possess the fundamental understanding that technical terms in the field of medicine in context should be strictly read with *on'yomi* and never with *kun'yomi*[4]. The results of the study further accentuated the importance and need for a detailed analysis of medical terminology through the venue of vocabulary classification, and the value of a linguistic understanding of medical terminology in facilitating the academic study of medicine.

Finally, though there have been a number of studies on medical terminology, it appears that there is a remarkable absence of studies on foreign loanwords, hybrids and mimetic words in medical vocabulary.

3. Aim and Research Questions

The aim of the present study is to perform an analysis of the vocabulary groups in contemporary Japanese medical terminology within the context of the strata of Japanese vocabulary, based on the framework of stratums as described by Yamaguchi (2007). An attempt will be made to deepen and refine the lexical classification proposed by Yamaguchi for each specific sub-group of medical vocabulary. The source material for the vocabulary analysis is 家庭の医学—コンパクト・メディカ *Katei no igaku: konpakuto medika* (Shōgakkan, 2000), which will be introduced further in 4.1. The results of the analysis will be discussed in the context of what qualities are

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4 Hashimoto, Mika et al. (2009) *Iryōkei daigakusei ni okeru igakuyōgo no yomi no chikara ni kansuru chōsa* [Investigation of Healthcare Students' Ability to Read Kanji Medical Terms], pp. 32-33

characteristic for technical medical terminology with a greater level of precision but simultaneously lower accessibility, in comparison to the terminology used in medical texts intended for a wider reader base where there is a greater emphasis on accessibility.

The specific research questions to be studied are the following:

- What are the characteristics of contemporary medical vocabulary in Japanese as expressed in *Katei no Igaku*?

- Are Yamaguchi's classification and analysis parameters adequate for covering medical vocabulary? If not, why and what modifications need to be made?

- What are the dominant vocabulary types and sub-types among the medical vocabulary analyzed?

4. Material and Method

4.1 Source Material: Katei no Igaku

Medical terminology will be extracted from 家庭の医学―コンパクト・メディカ *Katei no igaku: konpakuto medika* (Shōgakkan, 2000), a compact format medical guidebook intended as a home reference book. It is written and edited with the involvement of over eighty medical professionals and prefaced by editor-representative Norio Yanagishita, former professor of medicine at Keiō University. Spanning around a thousand pages, the contents are divided into four sections covering emergency treatment, symptom-based diagnosis, diseases and standard treatments, and everyday medical knowledge respectively. The book was chosen as the source material since it covers a wide range of medical topics and thus contains an adequate variety of medical terms for the analysis of vocabulary groups. Also, there is a clear and specific target reader group in non-medical professionals which can be taken into account during the analytical process and in comparison with data from previous quantitative studies[5].

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5 Kimu, E Ran, Kiryū, Rika et al. (2008)

4.2 Method of Vocabulary Extraction and Categorization

The aim of the vocabulary extraction process in the present study was to acquire a list of terms from the source material for further quantitative and qualitative analysis. Due to the complexity of the medical terminology and the quantitative aspect of the analysis intended, it was decided that the target number of terms to be included in the analysis would not exceed three hundred. In addition, previous quantitative data shown in the Kimu, E Ran, Kiryū, Rika et al. (2008) study indicates that medical vocabulary from a source intended for medical professionals display a significant variation in terms of distribution of vocabulary type when compared to sources for non-medical professionals. The source material can already be categorized as targeting a non-professional reader base. However the vocabulary extraction procedure and parameters will also affect the professional or non-professional bias of the terminology to be analyzed.

Following these considerations, words from the lengthy and detailed table of contents were selected and in order to acquire an even distribution of terms from the various parts of the source material. As the table of contents is designed to facilitate the reader finding their desired content, it is expected that it will contain highly accessible terminology. The first five medical terms (or fewer if less than five were available) from each subheading in the contents were selected to be included. Terms that were found more than once were omitted. Lengthier compound terms were not broken down into shorter single words but extracted as single words.

5. Background and Theory

In this thesis, the analytical process will be based on the theory in the vocabulary chapter of *Japanese Linguistics: An Introduction* by Toshiko Yamaguchi (2007), which provides an overview of the divisions of Japanese vocabulary alongside commentary with illustrative examples for each stratum. Due to the strong elements of etymology based guidelines in the classification of Sino-Japanese that is difficult to apply in medical Sino-Japanese vocabulary, the use of compound classifications based on Yamaguchi's analysis of nominal compounds will be applied instead, and will be adapted beyond the original scope of two character Sino-Japanese terminology. The following is a summary of the vocabulary strata and compound types.

5.1 Native Japanese Words

- Referred to as 和語 *wago* in Japanese, originated in Japan before Chinese words and writing system were actively borrowed and integrated into the Japanese language during

the sixth century, hence the oldest vocabulary group in Japanese. The *kanji* character 和 *wa* is an alternative historical designation for Japan.

- Characterized by original native Japanese readings, the *kun*-reading or 訓読み *kun'yomi*. Numerous individual words have single Chinese characters, *kanji* assigned to them as part of the initial integration, as it is generally believed that there was no writing system for Japanese prior to the import of *kanji*. Examples of this are words such as みず *mizu* written in *kanji* as 水.

- A significant portion of native Japanese words consists of *kanji* followed by *hiragana* in order to complement and complete the word. For example, the −ける *–keru* portion of 近付ける *-chikazukeru*. This portion of the word, usually associated with the possibility of conjugation, is referred to as *okurigana*.

- Words and expressions in everyday life that are used with the highest frequency tend to be native Japanese terms. Examples of categories that fit this designation are basic anatomy (body parts), common verbs (everyday actions), weather words and expressions.

5.2 Sino-Japanese Words

- Sino-Japanese words or 漢語 *kango*, came to Japan from China via Korea during the sixth century in association with the spread of Buddhism during the period. Awareness and contact with Chinese words existed before this as well but the large scale spread of *kango* as well as *kanji* came with the necessity for the Japanese people to read Buddhist scriptures from China. Due to the fact that the loans occurred in the distant past and their significant connection to the development of Japanese vocabulary, words from this stratum are not generally perceived as foreign to the present-day Japanese people.

- Not only were Chinese characters and words integrated into Japanese, but further adaptations and alterations were made as the Japanese arranged the characters in novel combinations to construct new words, and assigned new meanings to pre-existing terms in Chinese. Regarding the forms of adaptation of Chinese characters and words, Yamaguchi suggests the following four general categories (note that this form of classification is difficult to apply to large quantities of medical terminology due to the lack of available sources on etymology of many individual terms):
  - Vocabulary that co-exists in Japanese and Chinese, sharing the same meaning, with examples such as 夜景 *yakei*, 'scenery by night', 秘密 *himitsu*, 'secret', and 調和 *chōwa*, 'harmony'.

- Words that can be found in both Japanese and Chinese, yet with significantly different definitions for each language. Some of the more eye-catching common examples of these false cognates are 愛人 *aijin*, 'mistress' in Japanese but 'spouse' in Chinese, 勉強 *benkyō*, 'to study or learn' in Japanese but 'to do something reluctantly or with difficulty' in Chinese, and 便宜, *bengi*, 'convenient' in Japanese but 'cheap' in Chinese.

- A portion of the words are constructed in Japan and exist solely in Japanese, with no valid definition in Chinese. Words that can be classified as such includes 非常口 *hijōguchi*, 'emergency exit', 度胸 *dokyō*, 'courage' and 挨拶 *aisatsu*, 'greeting'.

- Finally there is a group of words constructed in Japan that have been re-integrated into the Chinese language, referred to as 和製漢語 *wasei kango*, or 'Sino-Japanese vocabulary made in Japan' in Japanese. A vast majority of these words came to be during the Japanese industrialization and modernization in the Meiji Period, during which the native vocabulary proved to be insufficient to cover new knowledge and concepts that arrived from Western nations. Some examples of these words are 哲学 *tetsugaku*, 'philosophy', 科学 *kagaku*, 'science', and 工業 *kōgyō*, 'industry'.

- The Sino-Japanese vocabulary possesses the qualities such as higher specificity and a logical structure that naturally suggests that their usage ideal in scenarios where accuracy is essential. Contrasting a native Japanese word with a Sino-Japanese synonym, it can be illustrated that the former, 寝る *neru*, 'to sleep', is open to being complemented with more details such as time and location in a phrase and denotes the activity of sleeping alone, yet in the case of the latter, 就寝する *shūshin-suru*, the compound generated by the two Chinese characters is specific for going to bed and sleeping.

- Furthermore, these words possess 音読み *on'yomi* readings, phonetic approximates of the Chinese readings. A notable issue regarding Sino-Japanese vocabulary is the multitude of readings available to a single *kanji* reflecting the historical time and region of origin of the transfer of the character from Chinese into Japanese.

5.3 Foreign Loanwords

- Foreign loanwords or 外来語, *gairaigo*, first entered the Japanese language during the beginning of the sixteenth century with the landing of Portuguese traders in the southern islands of Japan.

- Adoption of these words took place historically during three distinct time periods:

  - The sixteenth century, during which the primary interaction with Western nations were through traders and missionaries. These loanwords were often written with *kanji* that were either phonetic equivalents or selected based on having an appropriate meaning. 加留多 *karuta*, or 'Japanese syllabary cards', is an example of the former and 煙草 *tabako*, or 'cigarette' is an example of the latter.

  - The second phase occurred during the Edo period, when the 鎖国 *sakoku* isolation policy of the Shogunate greatly restricted contact with the Western nations. Only Dutch and Chinese traders were exempt from the ban and as a result Dutch vocabulary entered the Japanese language. Words such as コップ *koppu*, 'cup' and ランドセル, *randoseru*, 'schoolbag' are examples of loanwords in Japanese today from this era and have their roots in the Dutch words *kop* and *ransel*. This is also the period where *katakana* widely came into use as the character type of choice for these new loanwords.

  - A third phase of significant transfer of foreign vocabulary into Japanese occurred in the post-Meiji Restoration period, where the cultural dominance of English through the colonial powers Great Britain and the United States had a noticeable impact on the Japanese vocabulary in most aspects of everyday language. From foods such as ice cream and salad to sports like golf and tennis, loanwords from English came to permeate the everyday life of the Japanese.

- Yamaguchi also provides a detailed classification of the manner of which foreign loanwords are adopted into Japanese. Adoption in all cases involve the adjustment of moraic structure of the words and compromises where there is a lack of phonetic equivalents in Japanese.

  - A transfer that leads to no change in definition or method of usage, defined by Yamaguchi as 'direct transfer', and can be concluded from the examples provided by Yamaguchi to be generally applicable to single word or short nouns.

  - Shortened forms, as the name indicates, involves the contraction of the original foreign word or phrase, and usually down to four or five morae. Examples

frequently seen in everyday use are デパート *depāto*, for 'department store', アパート *apāto*, for 'apartment' and コンビニ *konbini*, for 'convenience store'.

- Adaptations are also made in some cases for grammar during the integration process. The most common targets for modification are plural markers, present and past participle markers and conjunctions. One example of this is 'slippers' in English being contracted to スリッパ *surippa* in Japanese, dropping the plural suffix.

- Semantic changes are also an aspect of foreign loanword integration described by Yamaguchi, who suggests the scenarios 'narrowing' and 'broadening' for a increase in specificity of the original definition of the word and the opposite. An example of 'narrowing' provided by Yamaguchi is ステッキ *sutekki*, from 'stick' that in its Japanese form has lost the verbal definition of to adhere to but only possesses the rod-like object definition. Similarly, セックス *sekkusu* from 'sex' only bears the meaning of sexual intercourse and not the definition of gender.

- Similar to how a portion of Sino-Japanese words are constructed in Japan and acquires definitions that are unique for Japanese, there are also numerous uniquely Japanese foreign loanword constructs, or 和製英語 *wasei eigo*. Examples of these are ペーパードライバー *pēpādoraibā* for a person who does not drive despite having a license, and オールドミス *ōrudomisu* for a single woman past the general consensus for age of marriage, an old maid. Though they may be perceived as quirky to native speakers of the language of origin of these words, they have nevertheless become an indispensable part of the standard vocabulary in Japanese.

5.4 Hybrids

- As an additional group accounted for by Yamaguchi, hybrids or 混種語 *konshugo* are compound words that consists of combinations of words from the three classes mentioned above, an expansion of the Japanese vocabulary that is an inevitable consequence of the complete integration of the three strata into Japanese. Combinations may appear in any permutation and order for these terms. アトピー性皮膚炎 *atopiiseihifuen*, 'atopic dermatitis' is an example of a hybrid term composed of foreign loanword and Sino-Japanese elements. In some cases, words written entirely in *kanji* can also be a hybrid in the form of a combination of Sino-Japanese and native Japanese

elements, examples being 四十肩 *shijūkata*, 'frozen shoulder' and 野球肘 *yakyūhiji*, 'Little League elbow, humeral epicondylitis'.

5.5 Mimetic Words

- A final group to be discussed is the mimetic words in Japanese, sometimes generalized as onomatopoeia, but in fact composed of three groups where only one is strictly speaking onomatopoetic. These terms are recognizable through their morphological traits of either being either doubled or preceding an adverbial indicator と *to*.

  - Phonomimes (擬音語 *giongo*), or the group regarded as onomatopoetic, contains the words based on imitations and reproductions of sound as conventionally perceived such as とんとん *tonton*, for a knocking sound, and がちゃんと *gachanto*, indicating the drop and shattering of an object such as a vase.

  - Phenomimes (擬態語 *gitaigo*) are the words that describe the manner in which something happens or something is. もしゃもしゃ *moshamosha* for instance is used to describe shaggy, bushy hair, while ぱくぱく *pakupaku* delineates the opening and closing of a mouth while eating.

  - The final group of mimetics, psychomimes (擬情語 *gijōgo*) act as descriptors of what people are feeling on the inside, with examples such as びくびく *bikubiku* for fear.

5.6 Classification of Nominal Compounds

The classification of compounds used by Yamaguchi is defined though the relationship between elements in Japanese compounds, where the first *kanji* of the compound is designated element 1 (E1) and the second designated element 2 (E2). The seven classifications proposed are:

1. E1 is an opposite to E2, such as 親子 *oyako*, 'parent and child' or 大小 *daishō*, 'sizes, large and small'

2. E1 is parallel to E2, for example: 思考 *shikō*, 'though, consideration, thinking' 停止 *teishi*, 'suspension, interruption, stoppage'.

3. E1 is repeated, frequently present in both native Japanese and Sino-Japanese words such as: 人々 *hitobito*, 'each person, people' and 山々 *yamayama*, 'many mountains, very much'.

4. E1 is a modifier of E2, such as 花畑 *hanabatake*, 'flower garden, flower bed' and 青空 *aozora*, 'blue sky'.

5. E2 is a component of E1, as in 山頂 *sanchō*, 'summit'.

6. E1 is responsible for an action on E2 (verbal modification), as in 殺人 *satsujin*, 'murder', or 読書 *dokusho*, 'reading'.

7. E2 is responsible for an action on E1, as in 稲作 *inasaku*, 'rice cultivation', or 日没 *nichibotsu*, 'sunset'.

Though this classification system is proposed by Yamaguchi for two character Sino-Japanese compounds, the core idea of classification based on the relationships between individually defined elements can be applied to compounds of other types.

5.7 *Medical Vocabulary in Japanese*

Medical vocabulary in Japanese consists of the same categories of vocabulary as Japanese vocabulary as a whole. Parallel to the entry of Sino-Japanese vocabulary was the spread of Chinese traditional medicine to Japan and in association to this, the establishment of a significant portion of core medical terminology of Chinese origin in the Japanese medical vocabulary. Medical works from China such as the *Newly Revised Materia Medica* and the *Tang Dynasty Materia Medica* were also known to be influential during the 8th century, with the latter being an obligatory text in the study of medicine at the Japanese Ministry of Health in 787 A.D.[6]

There is also a known link between the introduction of Western medicine and healthcare system into Japan during the Meiji era and the presence of foreign loanword medical terminology in the Japanese language. While many concepts and terms from the Western sciences, including medicine underwent a literal translation and became converted into Sino-Japanese terminology in Japanese vocabulary, a significant portion also entered Japanese as foreign loanwords. Germany had a particularly strong formative influence on the Japanese healthcare system, as numerous prominent Japanese physicians studied in Germany and acquired knowledge of the key breakthroughs of the period in fields such as bacteriology and the critical sanitation routines of the Industrial Age[7].

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6 Dharmananda, Subhuti. *Kampo Medicine: The Practice of Chinese Herbal Medicine in Japan.* Viewed 23 February 2014.

7 Lee, Jong Chan (2003) *The Making of Hygienic Modernity in Meiji Japan, 1869-1905*, Korean Journal of Medical History

6. Analysis

6.1 Results

6.1.1 Quantitative Data

A total of 266 words were extracted for classification and analysis (see appendix). The quantitative distribution of the vocabulary in the present study is compared to the reference data from the Kimu, E Ran, Kiryū, Rika et al. study in the table below.

	Kimu, E Ran, Kiryū, Rika et al. (2008)		The Present Study
	Professional	Non-Professional	Katei no Igaku
Native Japanese	3, 0.3%	25, 2.1%	27, 10.2%
Sino-Japanese	736, 64.1%	865, 72.9%	202, 75.9%
Foreign Loanwords	215, 18.7%	158, 13.3%	4, 1.5%
Hybrids	105, 9.1%	131, 11.0%	32, 12.0%
Acronyms	90, 7.8%	7, 0.6%	1, 0.3%
Total	1149	1186	266

The data from the present study indicates that among the vocabulary extracted for analysis from *Katei no Igaku*, the largest vocabulary group was Sino-Japanese at 75.9%, followed by hybrids at 12% and native Japanese at 10.2%. Finally, foreign loanwords were a mere 1.5% of the vocabulary analyzed and only a single acronym was present, or 0.3%. When contrasted with data from the Kimu, E Ran, Kiryū, Rika et al. study, there are clear trends across each vocabulary type. In native Japanese, Sino-Japanese and hybrids, the proportional presence of each vocabulary group increased from the professional vocabulary group to the non-professional group in the previous study, and peaked in the present study (for example native Japanese: 0.3% to 2.1% to 10.2%). On the other hand, for foreign loanwords and acronyms, there is an evident decrease in each vocabulary group from professional to non-professional to the present study (foreign loanwords: 18.7% to 13.3% to 1.5%).

Terminology from the current study has also been categorized based on eight categories of medical vocabulary applied in the Kimu, E Ran, Kiryū, Rika et al. study, based on a preliminary framework as proposed in *Byōin no kotoba wo wakariyasuku suru teian*, A proposal for the simplification of 'hospital language' from the National Institute for Japanese Language. The categories in the original Japanese are 身体 *karada,* 病気 *byōki,* 診療 *shinryō,* 薬 *kusuri,*

人・設備 *hito setsubi*, 介護 *kaigo*, and 生活 *seikatsu*. Respective translations can be found in the leftmost column of the following table.

	Native Japanese	Sino-Japanese	Foreign Loanwords	Hybrids	Acronyms	Total
The Human Body	4	12	0	0	0	16
Disease	22	174	2	31	1	230
Examination and Diagnosis	0	9	0	1	0	10
Medicine	0	0	0	0	0	0
People and Equipment	0	1	0	0	0	1
Principles and Organization	0	5	0	0	0	5
Caregiving	1	0	1	0	0	2
Life	0	1	1	0	0	2

The data here suggests that the largest vocabulary type in the present study is disease names at 230 words out of 266 (86.5%) with anatomical terms under 'the human body' placed second at 16 words and examination and diagnosis third at 10 words. Taking the vocabulary group the terms below to into account as well, the highest subpopulation of vocabulary is Sino-Japanese disease names at 174, followed by hybrid disease names (31) and native Japanese disease names (22).

6.1.2 Native Japanese and Sino-Japanese

27 native Japanese terms are found in the vocabulary extracted for analysis. Among these terms, 4 describe body parts: 耳 *mimi*, 'ear', 鼻 *hana*, 'nose', のど *nodo*, 'throat', and 歯 *ha*, 'teeth'. Additionally, 12 words are completely and 9 partially written in *hiragana* in spite of one or more available *kanji* alternatives, such as せき *seki*, 'cough', 三日ばしか *mikkabashika*, 'rubella'. 12 words are descriptors of symptoms such as ひきつけ *hikitsuke*, 'convulsions', むくみ *mukumi*, 'swelling, edema'.

Among the 202 Sino-Japanese terms, 12 words are written partially or fully in *hiragana* or *katakana*, for example てんかん *tenkan*, 'epilepsy', 躁うつ病 *sōutsubyō*, 'manic depression'. 3 words, 熱 *netsu*, 'fever', 症 *shō*, 'illness', and 脈 *myaku*, 'pulse' are single *kanji* words, while out of the remaining 199 words, 41 are two character compounds and the remaining 158 are compounds composed of three characters or more.

Though it is not possible to fully apply the partially etymology-based categorization framework suggested by Yamaguchi, it is recognizable that a large quantity of the Sino-Japanese terms are identical in Japanese and Chinese, for example 心臓 *shinzō*, 'heart', 呼吸 *kokyū*, 'breath, respiration', 嘔吐 *ōto*, 'vomiting'. There are no words present where the meaning in Japanese and Chinese are completely different in the same manner as 愛人 *aijin*. In terms of words exclusively found in Japanese however, some examples were present such as 近眼 *kingan*, 'nearsightedness' (近視 *kinshi* is the variation of the term that is common to both Japanese and Chinese), 打撲 *daboku*, 'blow, hit (on the body)', and notably the fundamental term 病気 *byōki*, 'illness, disease'. As a final group to be accounted for, a number of words that are constructed in Japan and re-integrated into Chinese can also be found in the terms extracted for the present study. 膵臓 *suizō*, 'pancreas' and 動脈硬化症 *dōmyakukōkashō*, 'arteriosclerosis, hardening of the arteries' are confirmed examples of terms constructed in Japan[8][9].

As mentioned during the introduction, synonyms can be frequently found in the form of pairs of native Japanese and Sino-Japanese. Within the scope of the analysis of the current study, there were also a number of such examples: むし歯 *mushiba*, 'cavity, tooth decay', う蝕症 *ushokushō*, 'tooth decay, dental caries', いぼじ *iboji*, 'hemorrhoid', 痔核 *jikaku*, 'hemorrhoid', 鳩胸 *hatomune*, 'funnel chest, pectus excavatum', 漏斗胸 *rōtokyō*, 'funnel chest, pectus excavatum'.

6.1.3   Foreign Loanwords, Hybrids and Acronyms

In comparison to the other vocabulary groups, foreign loanwords and acronyms were significantly fewer in number. The only four pure foreign loanwords found in the study were ホームケア *hōmukea*, 'home treatment', インフルエンザ *infuruenza*, 'influenza', ホルモン *horumon*, 'hormone', and マラリア *mararia*, 'malaria'. The sole acronym found in the present study was STD, or sexually transmitted disease, an acronym that is used in English as well as Japanese.

The 32 hybrid terms that were found in the study formed 12% of the total vocabulary analyzed. However it should be noted that every single hybrid term contained Sino-Japanese words,

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8 Kin, Kōrin (2005) *Kingendai no chūgokugo, kankoku-chōsengo ni okeru nihongo no eikyō: nihon no kanjigo no i'nyū wo chūshin ni* [The influence of Japanese on modern era Chinese and Korean: with an emphasis on the migration of Japanese kanji vocabulary], p. 117

9 Shen, Guo Wei (2010) *Nihon no jutsugo, chūgoku no jutsugo: sono rekishiteki ayumi to tenbō* [Japanese terminology, Chinese terminology: Historical progress and future outlook], p. 39

27 out of the 32 hybrids, or 84.4% contained foreign loanword term, while only 4 out of 32 or 12.5% contained native Japanese terminology (おむつ皮膚炎 *omutsuhifuen*, 'diaper rash', 野球肘 *yakyūhiji*, 'Little League elbow, humeral epicondylitis', かぜ症候群, *kazeshōkōgun*, 'common cold, nasalpharyngitis', 四十肩 *shijūkata*, 'frozen shoulder, adhesive capsulitis of shoulder') and only a single word contained an acronym, ＷＰＷ症候群 *WPW shōkōgun*, 'Wolff-Parkinson-White syndrome'.

6.1.4 Compound Analysis

Among the Sino-Japanese vocabulary found in the present study, 41 terms were composed of two characters and Yamaguchi's classification of nominal compounds could be applied to this subgroup for a quantitative analysis. The results are listed in the table below.

Classification Type	Quantity in the Current Study
E1 is an opposite to E2	0
E1 is parallel to E2	7
E1 is repeated	0
E1 is a modifier of E2	23
E2 is a component of E1	4
E1 is responsible for an action on E2 (verbal modification)	5
E2 is responsible for an action on E1	2

The most frequently occurring type of compound among these words were the ones where element 1 is a modifier of element 2, such as in words like 外耳 *gaiji*, 'external ear, concha', 斜頸 *shakei*, 'torticollis, wryneck' and 血管 *kekkan*, 'blood vessel'. Second and third most common are the types where element 1 and 2 are similar in definition (such as 嘔吐 *ōto*, 'vomiting', 打撲 *daboku*, 'blow, hit (on the body)' and ねんざ (捻挫) *nenza*, 'sprain'), and where element 1 is a verbal modifier responsible for an action on element 2 (for example 救命 *kyūmei*, 'lifesaving', 応急 *oukyū*, 'emergency, first-aid' and 脱臼, *dakkyū*, 'dislocation').

Yamaguchi's model for two character nominal compound classification can strictly speaking only be applied to a limited number of words in this study. However, using clearly defined elements and compounds as elements in extended compound terms, it is possible to examine the structure of

longer Sino-Japanese compounds, though comparative and quantitative data would require a different data gathering and sorting approaches than what has been applied for this study.

Three compound Sino-Japanese terms composed of six or more characters were selected for re-defined element based nominal compound analysis. The re-definition of elements involve designating not only single characters as elements but also multi-character compounds as elements in larger compounds. Additionally, rather than being limited to two elements, where further breakdown isn't possible the relationship between a greater quantity elements in a single compound is examined as well. The three terms selected were 慢性副鼻腔炎 *manseifukubikōen*, 'chronic sinusitis' 溶血性尿毒症症候群 *yōketsuseinyōdokushōshōkōgun*, 'hemolytic-uremic syndrome' and 真珠腫性中耳炎 *shinjushuseichūjien*, 'cholesteatoma'. The modified element definitions that were applied to these terms are listed in the table below. Furthermore, the terms that are extracted from the breakdown of the compounds are listed and analyzed.

慢性副鼻腔炎					
慢	性	副	鼻	腔	炎
E1	E2		E1	E2	
		E1	E2	E2	
		E1	E1	E1	E2
E1	E1	E2	E2	E2	E2

溶血性尿毒症症候群								
溶	血	性	尿	毒	症	症	候	群
E1	E2					E1	E2	
			E1	E2	E3			
E1	E1	E2				E1	E1	E2
E1	E1	E1	E2	E2	E2			
E1	E1	E1	E1	E1	E1	E2	E2	E2

真珠腫性中耳炎						
真	珠	腫	性	中	耳	炎
E1	E2			E1	E2	
E1	E1	E2		E1	E1	E2
E1	E1	E1	E1	E2	E2	E2

慢性 *mansei*, 'chronic' E1 is a modifier of E2

鼻腔 *bikō*, 'the nasal cavity' E2 is a component of E1

副鼻腔 *fukubikō*, 'paranasal sinus' E1 is a modifier of E2

副鼻腔炎 *fukubikōen*, 'sinusitis' E1 is a modifier of E2

慢性副鼻腔炎 *manseifukubikōen*, 'chronic sinusitis' E1 is a modifier of E2

溶血 *yōketsu*, 'hemolysis' E1 is responsible for an action on E2 (verbal modification)

症候 *shōkō*, 'symptoms' E2 is a component of E1

尿毒症 *nyōdoku*, 'uremia' E1 and E2 are both modifiers of E3

溶血性 *yōketsusei*, 'hemolytic' E1 is a modifier of E2

症候群 *shōkōgun*, 'syndrome' E1 is a modifier of E2

溶血性尿毒症 *yōketsuseinyōdokushō*, 'hemolytic-uremia' E1 is a modifier of E2

溶血性尿毒症症候群 *yōketsuseinyōdokushōshōkōgun*, 'hemolytic-uremic syndrome' E1 is a modifier of E2

真珠 *shinju*, 'pearl' E1 is a modifier of E2

中耳 *chūji*, 'middle ear, tympanum' E1 is a modifier of E2

真珠腫 *shinjushu*, 'cholestatoma, pearl tumor' E1 is a modifier of E2

中耳炎 *chūjien*, 'otitis media, inflammation of the middle ear' E1 is a modifier of E2

真珠腫性中耳炎 *shinjushuseichūjien*, 'cholestatoma' E1 is a modifier of E2

As the words chosen as examples above demonstrate, the overwhelmingly dominating relationship between elements in extended compounds is that of modification, with a few examples of modification through action (E1 on E2) and E2 being a component of E1, while the remaining four types of element relationships are not present at all in the very limited number of sample terms used for this analysis.

6.2 Discussion and Conclusion

6.2.1 Discussion

The quantitative breakdown of the words selected from *Katei no Igaku* (2000) by vocabulary types, when compared to the previous study by Kimu, E Ran, Kiryū, Rika et al, (2008) displayed general trends in all of the vocabulary types analyzed. Sino-Japanese vocabulary was found to be the dominating vocabulary type across both studies, in the current study the second and third most frequently found vocabulary groups were hybrids and native Japanese words, while the previous study had foreign loanwords as second and hybrids third. It must be noted that these results come from two studies with significant differences in method and material.

The vocabulary selection from previous study was produced through the generation of a corpus from articles and data from the field of medicine and filtered through an algorithm which provided deviation values indicating whether the terms show greater tendency towards being a technical term or a general term (accessible and comprehensible for non-medical professionals). The final count for the vocabulary in the groups were 1186 for general medical vocabulary and 1149 for technical terms. It should be noted that this is a higher quantity than in the present study where the final count of vocabulary included is 266. The vocabulary in the current study is also selected from the table of contents, based on the reasoning that as the words are located at the entry point into the compact version of the home use medical guide *Katei no Igaku*, these level of accessibility should be very high since risk of incomprehension or miscomprehension would render the book unhelpful for its intended target audience. Also in need of being accounted for is the fact that a theoretical process of corpus generation, while reproducible and stringent, does not provide complete accuracy. A close examination of the terminology as classified in the previous study shows terms such as 患者 *kanja*, 'patient', 問題 *mondai*, 'question' and 薬局 *yakkyoku*, 'pharmacy' listed under technical terms. Due to the easily understandable and frequently used nature of these terms, it would not be unreasonable to expect that under a different framework for extraction, they may very well be considered general terms instead.

Additional data to be considered is the vocabulary category breakdown, where in the current study over 80% of the vocabulary were related to diseases. A breakdown of this kind was also provided in the previous study, however direct comparison cannot be performed due to the fact that exact numerical data was unfortunately not presented. Based on the bar graph data presentation however, it is possible to ascertain that in general vocabulary, slightly over 35% were related to diseases, slightly over 20% were anatomical, and around 15% were related to diagnosis, forming the three largest groups. In the technical vocabulary category, the largest group was principles and organization, at around 20%, followed by diagnosis and diseases, both at slightly above 15%.

Through the compilation of these data, it is possible to conclude based on observation in the previous study alone but further supported with the current study that with an increase in proportion of words related to disease in the vocabulary analyzed, the quantity of native Japanese, Sino-Japanese words and hybrids also increased while foreign loanwords and acronyms decreased. It would also be possible to argue that these trends may also be linked to the tendency of the vocabulary sets analyzed towards technical or general, under the assumption that the vocabulary in the present study shows a stronger tendency towards general medical vocabulary than technical. However a key issue in this line of reasoning lies in the fact that since the extraction method in the current study varies greatly from the corpus generation of the previous study, a comparison along a scale of technical versus general for should not be made with this vocabulary data. Nevertheless, the

tendency is still present even if the previous study is analyzed alone and warrants further investigation.

It is perhaps slightly surprising that the defining vocabulary strata for technical medical terminology relative to general terminology in the previous study was not Sino-Japanese but foreign loanwords as well as abbreviations and acronyms, a subgroup that was completely unmentioned in Yamaguchi's definition of Japanese vocabulary. However, these categories of medical vocabulary were not visible in the present study largely due to the scope of the vocabulary selected. While an analysis of a specialized collection of foreign loanword medical colloquialisms such as one available online from the Nippon Medical School Tama Nagayama Hospital[10] would be more likely to yield additional data for further analysis of the role of foreign loanwords in technical medical vocabulary (a preliminary look at the numerical data from the list indicates that 14.7% of the words are of German origin), such an undertaking is not within the range of the current study.

Interestingly, there is also some cross-over between the foreign loanword strata of Japanese medical vocabulary and the abbreviation and acronym category. While Japanese abbreviations certainly exist in medical vocabulary (cholecystectomy, the surgical removal of the gall bladder is shortened in Japanese from 胆嚢摘出術 *tannōtekishutsujutsu* to 胆摘 *tanteki* for example), there appears to be a significant quantity of non-Japanese acronyms written in their English forms that are a part of the technical language of medicine in Japanese. The sole acronym found in the current study is STD, or sexually transmitted disease, written as it is in English with no conversion into the Japanese character systems. In a medical context, two reasons come to mind for the increased usage of abbreviations and acronyms, one being practicality, as lengthy medical terms do not make for fluent oral exchange of vital information. A secondary reason involves examples like STD and, to use an example not included in the current study, TB for tuberculosis. These are diseases that carry or once have carried significant social stigma and therefore using an abbreviation or acronym provides an euphemistic quality in this context. Similar to the scenario with foreign loanwords, data for further analysis is readily available in the form of vocabulary lists[11] that provide accumulated data in more useful quantities than obtainable within the scope of the current study.

Among the native Japanese and Sino-Japanese terms collected for this study, there were numerous examples of terms written not in their specific *kanji* but in *hiragana* and to a lesser extent

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10 *Katakana igaku zokugoshu (kyūkyū iryōhen)* [Katakana Medical Colloquialisms, Emergency Medicine Edition], viewed 20 December 2013. <http://plaza.umin.ac.jp/~GHDNet/98/g821zoku.html>

11 *Igaku no ryakugo* [Medical Abbreviations], viewed 29 December 2013. http://trhome.med.u-tokai.ac.jp/contents/TC/abbreviation.htm

katakana instead. In a study by Eriko Nakayama [12], the phenomenon of using an alternative character type in the written form is discussed, primarily pertaining to the phenomenon of usage of *katakana* in non-foreign loanwords. Nakayama suggests six different reasons for *katakana* replacement scenarios, of which two are relevant to the current study. The first is the character change to improve legibility due to an uncommon or difficult reading. Due to the difficult nature of a large quantity of medical terms and in particular the non-standard *kanji* they are written with, it does not come as a surprise that this is in fact the explanation in the majority of scenarios (examples being 汗疹 *asemo*, 'prickly heat, heat rash', 疣痔 *iboji*, 'hemorrhoid', 癲癇 *tenkan*, 'epilepsy, epileptic fit' and 痙攣 *keiren*, 'convulsions, cramps'). An additional category discussed by Nakayama regarding *katakana* is one where there is no ostensible purpose to the alternative character use. In the case of かぜ *kaze*, 'common cold', 吐きけ *hakike*, 'nausea, sickness in the stomach' and むし歯 *mushiba*, 'cavity, tooth decay' where the *kanji* characters are relatively common, there appear to be no apparent reason for changing the character to *hiragana* other than stylistic reasons.

However, there is also a specific reason, unmentioned in Nakayama's study, for avoiding using *kanji* that is of particular relevance to vocabularies and scenarios where both general and technical vocabulary may be included. A number of Japanese words have multiple readings and in the medical context there are differences of nuance and formality levels depending on which reading is used. In such scenarios either the use of *furigana* to denote the correct reading or replacing the text with *hiragana* or *katakana* are valid options. Two examples found in the current study are はしか 麻疹 *hashika* or *mashin*, 'measles' and むくみ 浮腫 *mukumi* or *fushu*, 'swelling, edema'. While the *kun'yomi* reading is denoted in both cases in *Katei no Igaku*, not unexpected due to the aforementioned necessity for accessibility, Hashimoto's previous study [13] on the reading of medical terminology has stated that as a general rule, in contexts targeting healthcare professionals, the *on'yomi* reading should be applied.

An additional observation of interest was the presence of high quantities of terms such as *hashika* and *mukumi* in the native Japanese vocabulary, conditions visible from the body surface without need for advanced technology to visualize. Other examples of this kind of conditions within the native Japanese category in the current study are あせも *asemo*, 'prickly heat, heat rash' かぶれ *kabure*, 'rash, eruption', ものもらい *monomorai*, 'sty (on the eyelid)' and いぼじ *iboji*, 'hemorrhoids'. Though the sample size of the current study is too small to draw definitive

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12 Nakayama, Eriko (1998) *Higairaigo no katakana hyōki* [Katakana transcription of non-foreign loanwords]
13 Hashimoto, Mika et al. (2009) p. 32

conclusions, it seems logically consistent that the older vocabulary type, native Japanese, would contain medical conditions that can be observed and diagnosed without advanced technology and that people would likely to have possessed knowledge of since the dawn of the Japanese language.

The analysis of Sino-Japanese medical vocabulary posed a minor challenge in the present study due to the difficulty in applying the categorization provided by Yamaguchi. Not only are there evident issues present in confirming the etymological origin of every medical term to be analyzed, further refinements of the system would be required when compound words that are partially Japanese in origin and partially Chinese are to be assessed. Additionally, regional differences in are present and cause significant problems to the categorization of whether terms exist in both Japanese and Chinese or not. Regions such as Taiwan with stronger cultural ties to Japan demonstrate stronger tendencies for shared vocabulary even among modern day newly created words[14]. Also, it does not seem sufficient to end the categorization upon finding the words and confirming similar definition as there are significant differences in the frequency of usage of the terms. 下痢 *geri*, 'diarrhea' for instance is not difficult to understand in Mandarin Chinese due to the high specificity of the *kanji* 痢, however it is rarely used. On the other hand, 病毒 *byōdoku* in Chinese can be found in a Japanese dictionary but is generally passed over for ウイルス *uirusu*, 'virus'.

Due to the difficulties in applying Yamaguchi's standard framework for Sino-Japanese words, the nominal compounds classification was used instead, reducing the Sino-Japanese vocabulary analyzed to 41 two character words. Not unsurprisingly, due to the very nature of the descriptive structure of medical vocabulary, modification between elements was the most common category. It is perhaps not at all surprising that within the significantly limited quantity of words analyzed, not a single example of opposite elements or repeated elements were found, since they are typically representative of words indicating a span or range and words reinforcing a certain concept, idea or emotion respectively.

As a complement to the analysis of two character words, three examples of longer Sino-Japanese vocabulary were chosen broken down with constituent compounds redefined as elements at all available levels where independent words can be formed. Quantitative data from these attempts display the same results as for the two character compounds, that is to say element modification is the most common category, and no examples were found of element opposition or repetition. More interesting however is the information brought forth by a comparison to the English definitions of the completely compound as well as each constituent word. While two of the three terms matched the English definitions very well part by part, the final term, 真珠腫性中耳炎

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14 Chung, Karen Steffen (2001) *Some Returned Loans: Japanese Loanwords in Taiwan Mandarin.* Chapter 7 p. 3

shinjushuseichūjien, differs significantly from the English 'cholesteatoma', even when analyzing the Greco-Latin word roots of the term. Chol– and stea– suggests 'bile' and 'fat', while –toma comes from 'soma' and means 'body'. While the Japanese term describes the condition as a middle ear infection due to a pearl-like growth, the English term suggests a growth that consists of bile and fat. Unlike the previous two compounds analyzed, the findings suggests that this word has a different etymological origin than being integrated into Japanese from a translation of the English equivalent.

The findings pertaining to Sino-Japanese compounds provide a possible explanation to the dominant nature of Sino-Japanese vocabulary even in non-professional vocabulary, as compounds that are modificational in nature, regardless of length does not necessarily impede understanding when individual component morphemes are easily understood. The lengthier terms, not uncommon in medical vocabulary, have components that provide additional context and specificity.

While Yamaguchi's study listed mimetic words as a significant component of Japanese, the current study finds no indication of the presence of such words in the general medical vocabulary range that was assessed, due to the fact that by limiting vocabulary extraction to the index, nominal terms were more commonly found while adjectives, adverbs and verbs, typical vocabulary types for mimetic vocabulary were significantly fewer. However, that does not indicate that this category of vocabulary is completely missing from medical Japanese. In fact, phenomimes and psychomimes that depict pain and nausea such as ちくちく *chikuchiku*, 'prickling, stinging, tingling' and くらくら *kurakura*, 'dizziness, giddiness' are key in assessing the subjective perception of symptoms by individual patients. In addition, diseases such as むずむず足症候群 *muzumuzuashishōkōgun*, 'restless legs syndrome' use phenomimes as a modifier component in the compound. However, a crucial factor behind why many of these terms are absent lies in the fact that textual data is analyzed in the current study and not spoken language. I would expect that the spoken language would be not only far richer in terms of mimetic vocabulary content, but a non-professional medical dialogue would contain a higher percentage of native Japanese terms while a professional dialogue can be expected to contain significantly more abbreviations and acronyms.

6.2.2 Conclusion

In the present study, the use of contemporary medical terms in a Japanese medical guidebook targeting non-professional readers was analyzed in order to acquire additional understanding of the characteristics of Japanese medical terminology in contexts targeting professional and non-professional readers, and the features that facilitate or worsen comprehensibility in these respective contexts. A framework by Yamaguchi (2007) was used for the classification and linguistic analysis of these terms. In addition, quantitative data was used from a

study by Kimu, E Ran, Kiryū, Rika et al. (2008) in order to compare quantitative data from this study with previous data as well as provide additional understanding as to how the data correlates to professional and non-professional medical terminology in terms of vocabulary constituents.

The findings from this study confirms expectations that the predominant type of vocabulary overall in Japanese medical vocabulary is Sino-Japanese vocabulary, the vocabulary category generally associated with technical terminology and contexts where more difficult and precise words are required. However, it was noted that the percentage constituent of Sino-Japanese vocabulary as well as other vocabulary groups varied within subsets of medical texts depending on the vocabulary category constituents, or to what extent the text is technical and specialized versus general and non-specialized. Notably, foreign loanwords, abbreviations and acronyms were found in very few numbers but could be found in significantly greater numbers in the previous analysis of professional and technical medical vocabulary, suggesting that there is greater difficulty in maintaining comprehensibility with the usage of these categories of vocabulary when targeting a non-professional audience.

The primary categorization method with a basis in etymology for Sino-Japanese terminology proposed by Yamaguchi was not applied due to difficulties in implementation for the current study. As a replacement, nominal compound element classification was utilized and also modified for application on Sino-Japanese compounds containing more than two characters. Though the sample sizes of the two character Sino-Japanese vocabulary analyzed was limited, the results suggested that the vast majority of element-to-element relationships in Sino-Japanese medical terminology were modificational, i.e. the first element acts on the second element in a similar manner as an adjective. The analysis performed on compounds containing more than two characters indicated that at least two groups of vocabulary can be discerned among longer Sino-Japanese compounds based on whether or not the word is a direct translation of the English equivalent. The large number of nominally modificational compounds in the present study suggests that the lengthy structures of these Sino-Japanese terms does not necessarily hinder comprehension even in non-professional readers, but rather provides greater specificity.

Limitations in the present study such as the selection of general as opposed to specialized vocabulary lead to limited possibilities of analysis of vocabulary groups that were present in low quantities such as the foreign loanwords and abbreviations/acronyms. Future research that expand into different or a larger variety of source material can cover these vocabulary groups in a more in-depth manner.

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Appendix

Vocabulary extracted for analysis with subheadings, 家庭の医学 コンパクト・メディカ, 小学館 *2000.*

第1部　応急手当と子どもの看護
目で見る救命手当と応急手当

救命
手当
応急
呼吸
心臓

子どもの看護〜基本のホームケア

ホームケア
症状
病気
アレルギー性疾患
成人病

第2部　症状から見た病気の判断
チャートで見る子どもの症状

熱
発疹
せき
嘔吐
下痢

症状から見た病気の判断

腹痛
吐きけ
ひきつけ
むくみ
呼吸困難

第3部　身体各部の病気と治療
新生児の病気

低出身体重児
早産児
新生児黄疸

分娩損傷
頭部軟部組織損傷

脳・神経の病気

憤怒けいれん
泣き入りひきつけ
熱性けいれん
てんかん
脳性まひ

心の病気

精神発達遅滞
自閉症
分離不安障害
過剰不安障害
回避性障害

視力・目

近視
近眼
単純近視
変性近視
屈折性近視

耳の病気

形態異常
外耳
湿疹
皮膚炎
耳

鼻の病気

鼻出血
急性鼻炎
慢性副鼻腔炎

のどの病気

アデノイド増殖症
慢性咽頭扁桃炎
腺様増殖症
扁桃炎
急性扁桃炎

口腔・歯

口唇裂
むし歯
不正咬合

呼吸器の病気

かぜ
インフルエンザ
肺炎
マイコプラズマ肺炎
細菌性肺炎

循環器の病気

高血圧
起立性調節障害
先天性心疾患
動脈管開存
ボタロー管開存

消化器の病気

食道裂孔ヘルニア
急性胃腸炎
便秘
消化性潰瘍
反復性腹痛

腎臓・尿路の病気

急性腎炎症候群
急性腎炎
ネフローゼ症候群
溶血性尿毒症症候群
ウイルムス腫瘍

性器の異常

停留性巣
停留睾丸
半陰陽
性器
先天性疾患

皮膚の病気

アトピー性皮膚炎
おむつ皮膚炎
おむつくぶれ
脂漏性皮膚炎
あせも

運動器の病気

斜頸
筋性斜頸
鳩胸
漏斗胸
野球肘

その他の病気

血友病
血液
小児肥満
小児糖尿病
ホルモン

子どもの感染症

風疹
三日ばしか
先天性風疹症候群
はしか
突発性発疹

乳房の病気

乳腺炎
授乳期乳腺炎
乳輪下膿瘍
乳腺症
乳腺嚢胞症

女性性器の病気

外陰炎
性器ヘルペス
女性性器
尖型コンジローム
バルトリン腺炎

脳・神経・脊髄の病気

脳出血
脳卒中
脳梗塞
脳血栓症
脳塞栓症

心の病気

精神分裂病
気分障害
躁うつ病
神経症性障害
神経症

目の病気

麦粒腫
ものもらい
眼瞼縁炎
ただれ目
眼瞼下垂

耳の病気

外耳道炎
鼓膜損傷
慢性中耳炎
真珠腫性中耳炎
航空性中耳炎

鼻の病気

急性鼻炎
鼻かぜ
鼻
肥厚性鼻炎
アレルギー性鼻炎

のどの病気

扁桃周囲炎
扁桃周囲膿瘍
のど
急性咽頭炎
のどかぜ

口・あご・歯の病気

う蝕症
磨耗症
歯
歯髄炎
歯根膜炎

気管支・肺の病気

かぜ症候群
流行性感冒
急性気管支炎
びまん性汎細気管支炎
気管支拡張症

胸膜・横隔膜の病気

自然気胸
胸膜炎
肋膜炎
膿胸
流行性胸膜痛

血圧の異常と動脈硬化

症
血管
血圧
低血圧
動脈硬化症

心臓の病気

不整脈
完全房室ブロック
洞不全症候群
ＷＰＷ症候群

脈

血管・リンパ管の病気

動脈瘤
胸部大動脈瘤
腹部大動脈瘤
解離性大動脈瘤
脳動脈瘤

食道の病気

食道アカラシア
特発性食道拡張症
食道神経症
食道けいれん
消化器系

胃・十二指腸の病気

急性胃粘膜病変
急性胃炎
急性胃潰瘍
慢性胃炎
表層性胃炎

腸・腹膜の病気

急性腸炎
慢性腸炎
食中毒
腸炎ビブリオ食中毒
カンピロバクター食中毒

直腸・肛門の病気

直腸ポリープ
直腸脱
痔核
いぼじ
外痔核

肝臓・胆道の病気

ウイルス肝炎
急性肝炎
慢性肝炎

胆道
劇症肝炎

膵臓の病気

急性膵炎
膵臓
脾臓
慢性膵炎
膵嚢胞

腎臓・尿路の病気

慢性腎炎症候群
泌尿器
無症候性たんぱく尿
血尿症候群
腎硬化症

男性性器の病気

前立腺肥大症
男性性器
前立腺炎
前立腺ガン
精索捻転症

皮膚の病気

皮膚炎
かぶれ
接触皮膚炎
アトピー性皮膚炎
脂漏性湿疹

骨・関節・筋肉の病気

寝ちがえ
くび曲がり
肩こり
肩関節周囲炎
四十肩

けが（外傷）

打撲
挫傷