A Pronunciation of English Medical Loanwords Produced by Thai Nurses: A Case Study at Nopparat Rajathanee Hospital

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Abstract—The study of English loanwords produced by Thai speakers has received much attention. However, to the best of our knowledge, this is the first study of English medical loanwords produced by L2 Thai nurses. The data used was 395 English medical loanwords in sentences. The analysis was divided into two main parts: phonological and morphological. For the phonological analysis, the influence of L1 Thai was found in the production. It was also found that there is a difference between the way Thai nurses and L2 Thai learners say the same English sounds, especially when the English sounds do not exist in the Thai sound system. For the morphological analysis, seven strategies of word formation were found, including keeping the same word, acronym, abbreviation, phrasal clipping, back clipping and adding other sounds, lengthening of abbreviation, and different pronunciations to distinguish words. Some strategies, such as lengthening of abbreviation, were not found in the formation of English loanwords in Thai, and some strategies in the formation of English loanwords in Thai were not found in the formation of English medical loanwords. These results suggest that English medical loanwords used by Thai nurses have unique characteristics which enhance the communication among healthcare professionals.

Index Terms—Thai, nurses, English medical loanwords, healthcare professionals, loanwords

I. INTRODUCTION

In this modern generation, English loanwords have played an essential role in the Thai vocabulary repertoire. English words were taken into Thai in the early Ratanakosin period when there was an increase in trade and power of the British to Southeast Asian countries (Nacaskul, 1979). When dealing with medical sciences, English has greater influence on Thai than other languages. This might be due to the universal property of English as a means to communicate globally. The other reason might be due to the medical superiority of some of the countries that use English as their first language. The latter reason is particularly true in the conversational communication among nurses, especially Thai nurses.

With regards to the working environment of health care practitioners, speed and accuracy of communication is important as time is often of the essence when trying to save people’s lives. For nurses, the communication among them needs to be effective within limited time. They are in the profession where diversity in cultural and social communication is part of their working context (Lolaty et al., 2011). Miscommunication might result in dissatisfaction of staff and patients, or even poor care collaboration (Chapman, 2009). Nurses are in a working environment which is different from other professionals. The language they use when communicating amongst themselves, with other health care professionals and patients is thus interesting.

A number of studies of English loanwords produced by Thai speakers have been carried out (e.g., Gandour, 1979; Kenstowicz & Suchato, 2006; Nacaskul, 1979; Rungruang, 2007). For example, Kenstowicz and Suchato (2006) reviewed the results of a study of English loanwords in Thai and explained these results with a model of loanword adaptation. Another study is by Gandour (1979) and this investigates the rules for converting the English stress and intonation into Thai tonal categories. However, none of these studies looked specifically at English medical loanwords produced by Thai nurses. This might be due to the small percentage of English loanwords which were found in Thai medical sciences. This was highlighted in a paper by Nacaskul (1979) which showed only 3.08% of English loanwords were used in the field of English loanwords in Thai. Moreover, many studies of L2 Thai speakers have been carried out with English loanwords in written texts (e.g., Kenstowicz & Suchato, 2006).

Thus, this is the first study to explore the pronunciation of English medical loanwords produced by Thai nurses. Thai nurses in this study were Thai learners who used English as a foreign language in Thailand; hence their aims might not be to have complete mastery in the L2 (Kitikanan, 2019). This study uses the pronunciation of Thai nurses at Nopparat

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Rajathanee Hospital. The context of this speech study is the working environment where Thai nurses mainly speak Thai and only use English loanwords when referring to medical terms. The research aim of this study is to investigate the pronunciation of English medical loanwords produced by L2 Thai nurses. It is interesting to find out how Thai nurses communicate among themselves and with other healthcare providers, and to what extent their native language (Thai) affects their pronunciation of English medical loanwords. This study provides the analysis of the pronunciation at the both phonological and morphological levels.

II. RESEARCH QUESTIONS

There are two research questions in this study: 1) What are the English sounds of the English medical loanwords which are phonologically produced by Thai nurses? and 2) How do Thai nurses morphologically form English medical loanwords?

III. LITERATURE REVIEW

A. Background on Thai Sounds

Thai is a tonal language. There are 21 consonant sounds: /w, p, pʰ, b, t, tʰ, d, k, kʰ, ʔ, m, n, ṣ, s, h, ɾ, f, s, h, tʃ, tʃʰ, j, l/. Nine are voiced and 12 are voiceless. These consonants can occur in the initial position. For the consonants in the final position, only some sounds can occur: /n, m, ɾ, w, k, t, p/, such as /larray/ “to turn” and /bąŋ/ “some”. The consonant sounds in Thai are presented in Table 1.

| Place of articulation | Manner of articulation | Bilabial | Labio-dental | Alveolar | Alveolo-palatal | Palatal | Velar | Glottal |
|-----------------------|------------------------|----------|--------------|----------|----------------|---------|-------|---------|
| Plosive               |                        | p pʰ     | t tʰ         | d         | k kʰ           | j       | y     |         |
| Nasal                 |                        | m        | n            | n         | n              | n       |       |         |
| Fricative             |                        | f        | s            |           |                | h       |       |         |
| Affricate             |                        |          |              |           |                | j       |       |         |
| Approximant           |                        | w        |              | r         |                | j       |       |         |
| Trill                 |                        |          |              |           |                | l       |       |         |
| Lateral Approximant   |                        |          |              |           |                |         |       |         |

With the vowels in Thai, there are 18 monophthongs and three diphthongs. The monophthongs are divided into short and long. The short ones are: /a, i, u, e, æ, o, ə/ whilst the long ones are: /a, i, u, e, æ, o, ə/. The diphthongs are: /ai, au, au/, such as /sr/ "spoiled".

B. Background on English Sounds

In English, there are 24 consonant sounds: /p, b, m, w, f, v, θ, ð, t, d, n, s, z, l, f, j, ʒ, ʃ, ʒ, dʒ, j, k, g, h/ as shown in Table 2. All consonants, except /ŋ/ can occur in the initial position. For the final position, all consonants, except /s, h, j, w/ can occur.

| Place of articulation | Manner of articulation | Bilabial | Labio-dental | Dental | Alveolar | Alveolo-palatal | Palatal | Velar | Glottal |
|-----------------------|------------------------|----------|--------------|--------|----------|----------------|---------|-------|---------|
| Plosive               |                        | p b      | t d          |        | k g      |                |         |       |         |
| Nasal                 |                        | m        | n            | n      | n        |                |         |       |         |
| Fricative             |                        | f v θ ʒ ʒ | s z j ʃ ʒ   |        | h       |                |         |       |         |
| Affricate             |                        |          |              |        |          |                | ʃ ʒ     |       |         |
| Approximant           |                        | w        |              | j      | j        |                |         |       |         |
| Lateral Approximant   |                        |          |              |        | l        |                |         |       |         |

The vowels in English are composed of 22 monophthongs and eight diphthongs (Roach, 2009). From these 22 monophthongs, there are seven short vowels: /i, o, e, æ, ø, ə/ and five long vowels: /i, æ, o, ə, u/. The schwa /ə/ is
A. Data Production

395 English medical loanwords were used in sentences. These sentences were composed by the first author who was a nurse in the medical intensive care unit with seven years of experience. The sentences were in Thai but the target words were in English. For example, ‘ผู้ป่วยมี Coffee ground’ (After giving streptokinase, it was found that the patient had coffee ground). The spelling of English medical loanwords was according to the spelling the doctors wrote for the healthcare providers. If the loanwords were in abbreviations, the target words would also be abbreviated. As there was no word with diphthong /au/ in the initial position of a syllable, there was no information on how these sounds would be articulated in English medical loanwords by Thai nurses.

The sentences were produced by the same author using an iPhone SE2020. The sound files are in MP3 format. For the validity of the analysis, the pronunciations of the target words in the sentences were checked by three nurses at Nopparat Rajathanee Hospital. They listened to the sentences and if there was a disagreement of the pronunciation between the three nurses and the first author, the target word would be changed. The target words were then transcribed using IPA symbols by the second author who had received phonetic training during her PhD degree. The transcription was also checked by another trained phonetician who is an English teacher with Thai background.

IV. METHODOLOGY

A. Data Production

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B. Data Analysis

The target words in English and their transcriptions were transferred to Microsoft Excel. The analysis was divided into two levels: phonological and morphological. For the phonological level, i.e. the realisations of consonant sounds: both single and cluster sounds, were investigated in the initial and final position. Similarly, the realisations of vowel sounds were also explored for short and long vowels, and diphthongs. For the morphological level, the word formation of English medical loanwords was examined. All data here were recorded in Microsoft Excel. The research project and its methodology, including data collection and data analysis, were ethically approved by Nopparat Rajathanee Hospital (Reference number: 16/2565).
V. RESULTS AND DISCUSSION

To explore the pronunciation of English medical loanwords by Thai nurses, the analysis was divided into two levels: phonological and morphological. The details are as follows.

A. Phonological Analysis

As the first research question is: Which are English sounds in English medical loanwords are phonologically realised by Thai nurses? The production of English medical loanwords greatly received positive transfer from the English phonemes that also existed in the Thai phonological system, i.e. Thai nurses tended to replace the Thai sounds for the English sounds that also phonologically occurred in Thai. For example, /f/ in ‘femur’ was articulated as /fiːˈmɜːr/ and /s/ in ‘sat’ was articulated as /sætˈt/. They also benefited from the aspiration in Thai, both at the beginning and after /s/ as Thai has both aspirated and unaspirated voiceless stops. For example, /t/ in ‘tube’ was pronounced with aspiration as /tʰw/, and /t/ in ‘stoke’ was without aspiration as /s.tok/. With regards to English /t/ and /n/ in the final position, sometimes they were found to be pronounced with the target-like sounds, but they could also be deleted in their production. For example, /t/ in ‘right’ /r/aɪt/ was pronounced as /lai/, and ‘n’ in ‘sign’ /sain/ was pronounced as /sa.j/. In addition, the results for the realisations of English sounds that did not exist in the Thai sound system and English vowels are presented as follows.

a. Consonant Sounds in Initial Position

Thai nurses were more likely to replace English consonant sounds which do not exist in the Thai phonological system with other Thai consonant sounds. The following single sounds in the initial position in English were found to be replaced with Thai sounds:

1) English /fr/ with Thai /kr/, such as ‘pressure’ /ˈpresiʃər/ as /prɛt.krə:/;
2) English /vr/ with Thai /wr/, such as ‘vessel’ /ˈvesəl/ as /wát.sūn/;
3) English /gr/ with Thai /kr/, such as ‘gown’ /ɡaʊn/ as /kǎ:w/;
4) English /tr/ with Thai /t/, such as ‘right’ /rəɪt/ as /lài/;
5) English /zr/ with Thai /sr/, such as ‘wheezing’ /ˈwi.t.zɪŋ/ as /wiː.t.sinj/;
6) English /θr/ with Thai /tr/, such as ‘thermometer’ /θɜːˈmɒmɪtər/ as /tʰɔ:m.mǐ.tɔː/;
7) English /dr/ with Thai /kr/, such as ‘discharge’ /dɪˈʃɜːr/ as /dɪt.kə.tʰiː/; and
8) English /dr/ with Thai /kr/, such as ‘oxygen’ /ˈɒksɪ.dʒən/ as /kɔ.xi.dʒə.n/.

The following results showing the replacement of sounds in the initial position are inconsistent with the findings in the study of Kenstowicz and Suchato (2006): English /dʒ/ with Thai /t/, /θ/ with Thai /tʰ/, /z/ with Thai /s/, such as 1) final voiceless stop was articulated with no audible release, such as /t/ in ‘admit’ /ˈæd.mɪt/ as /rʰetː.t.mǐːt/;
2) English /dʒ/ with Thai /t/, such as ‘bandage’ /ˈbændɪ.dʒ/ as /bən.dʒ/;
3) English /f/ was deleted or replaced with /p/, such as ‘off’ /ˈɒf/ as /f/;
4) English /θ/ with Thai /t/, such as ‘both’ /boθ/ as /bɔt/;
5) English /l/ was either deleted, replaced with /n/ or /w/, such as ‘alcohol’ /ˈælkɔ.həl/ as /rʰæn.kɔ.həl/;
6) English /s/ was either deleted or replaced with /t/, such as ‘epistaxis’ /ˌɛp.i.stə.kæsɪs/ as /rʰi.p.iːt.ə.kiaː/ and
7) English /b/ with Thai /p/, such as ‘rub’ /rʌb/ as /læp/;
8) English /d/ with Thai /t/, such as ‘ward’ /wɔːrd/ as /wɔː.t/;
9) English /g/ with Thai /k/, such as ‘bag’ /bæg/ as /bèːk/;
10) English /v/ with Thai /p/, such as ‘observe’ /əbˈzɜːrv/ as /ʔɔːv.p.sɔː.p/;
11) English /ʃ/ with Thai /t/, such as ‘push’ /pʊʃ/ as /pʰt/;
12) English /ʃ/ as Thai /t/, such as ‘stitch’ /striʃ/ as /sà.tʃ/; and
13) English /z/ as Thai /t/, such as ‘gauze’ /ɡəʊz/ as /lài/.

b. Consonant Sounds in Final Position

For the consonant sounds in the final position, it was found that Thai nurses changed English sounds that did not exist in the Thai phonological system as follows:

1) final voiceless stop was articulated with no audible release, such as /t/ in ‘admit’ /ˈæd.mɪt/ as /rʰetː.t.mǐːt/;
2) English /dʒ/ with Thai /t/, such as ‘bandage’ /ˈbændɪ.dʒ/ as /bən.dʒ/;
3) English /f/ was deleted or replaced with /p/, such as ‘off’ /ˈɒf/ as /f/;
4) English /θ/ with Thai /t/, such as ‘both’ /boθ/ as /bɔt/;
5) English /l/ was either deleted, replaced with /n/ or /w/, such as ‘alcohol’ /ˈælkɔ.həl/ as /rʰæn.kɔ.həl/;
6) English /s/ was either deleted or replaced with /t/, such as ‘epistaxis’ /ˌɛp.i.stə.kæsɪs/ as /rʰi.p.iːt.ə.kiaː/ and
7) English /b/ with Thai /p/, such as ‘rub’ /rʌb/ as /læp/;
8) English /d/ with Thai /t/, such as ‘ward’ /wɔːrd/ as /wɔː.t/;
9) English /g/ with Thai /k/, such as ‘bag’ /bæg/ as /bèːk/;
10) English /v/ with Thai /p/, such as ‘observe’ /əbˈzɜːrv/ as /ʔɔːv.p.sɔː.p/;
11) English /ʃ/ with Thai /t/, such as ‘push’ /pʊʃ/ as /pʰt/;
12) English /ʃ/ as Thai /t/, such as ‘stitch’ /strɪʃ/ as /sà.tʃ/; and
13) English /z/ as Thai /t/, such as ‘gauze’ /ɡəʊz/ as /lài/.

For these results, Thai nurses might have a problem of aurally differentiating English medical loanwords ‘right’ and ‘life’ when they occurred out of the context as they both pronounced as /lài/. In addition, the results of the following substitutions were in agreement with the findings in the study of Nacaskul (1979): English /dʒ/ with Thai /t/, /θ/ with

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Thai /t/, English /θ/ was either deleted and replaced with /l/, English /ð/ with Thai /l/, English /ʃ/ with Thai /t/, and English /ʒ/ as Thai /t/.

c. Clusters in Initial Position

Regarding the cluster in the initial position of English medical loanwords, some words showed that Thai nurses maintained the cluster in the production, such as ‘plan’ /plæn/ as /pʰlæ:n/ and ‘bled’ /bli:d/ as /bli:t/. However, for most clusters, the cluster was changed into single phoneme. The examples are as follows:

1) English /gʃ/ with Thai /k/, such as ‘degree’ /ˈdi.ɡɹi/ as /di:ki/;
2) English /bl/ with Thai /b/, such as ‘block’ /ˈblɒk/ as /bɔ:k/;
3) English /ht/ with Thai /t/, such as ‘stroke’ /ˈstaːk/ as /sà.tôk/;
4) English /ht/ with Thai /t/, such as ‘thrombus’ /ˈθɹəm.bəs/ as /tʰɔ:m.bát/; and
5) English /dθ/ with Thai /d/, such as ‘drop’ /dɔm/ as /dɔp/.

According to Nacaskul (1979), the existence of clusters in English loanwords used in Thai often occurs in the pronunciation of modern educated people. However, this reason might not be applicable with Thai nurses as they were speakers educated to degree level. The reason for the omission of the post-consonant sound after the first sound might be due to time pressures often found in their working environment which requires fast and efficient communication. For clusters with initial /s/, Thai nurses often inserted Thai /a/ after /s/ before the second sound in the cluster. For example, English /sk/ was realised as /sà.k/, such as ‘score’ /skɔ/ as /sà.kɔ/, and English /st/ was produced as /sà.t/, such as ‘step’ /sɛp/ as /sà.t/. The results above showed that most short vowels in English were replaced with Thai long vowels, i.e. English /æ/ with both /a/ and /æ/, English /e/ with /e/, English /i/ with /i/, English /ʊ/ with both /u/ and /ʊ/, and English /u/ with /u/. Many short vowels could be pronounced with more than one Thai sound, i.e. English /e/ with both /e/, /a/ and /ɛ/, English /i/ with /i/, /ɛ/ and /ɪ/, English /ʊ/ with both /u/ and /ʊ/, and English /ɛ/ with both /a/ and /ɛ/. The results from three vowels in English showed that they were replaced with the Thai vowels which were counterpart with one another, i.e. English /e/ with both /e/ and /ɛ/, English /i/ with both /i/ and /ɪ/, and English /ʊ/ with both /u/ and /ʊ/. The results that English /t/ was replaced with /t/ and English /s/ was replaced with /s/ are consistent with the findings in the study of Kitikanan (2020a) that L2 Thai learners mostly perceived English /t/ as Thai /t/, and English /s/ with /s/.

2. Vowel Sounds

With regards to the vowel sounds in English medical loanwords in Thai, they can be divided into three categories: short vowel, long vowel and diphthong as follows.

a. Short Vowels

There are in English: /ɪ, ə, e, æ, o/. Each of them was realised as follows.

1) English /æ/ was produced as long vowels /a:/ and /æ/, such as ‘palliative’ /ˈpeलɪətɪv/ as /pʰʌ.lai.tʰi.p/, and ‘admit’ /ˈæd.mɪt/ as /ʔæd.mɪt/;
2) English /e/ was articulated as /ɛ/, /a/ and /ɛ/, such as ‘sepsis’ /ˈsɛpˌsɪs/ as /sɛp.sɪt/, ‘vessel’ /ˈvesəl/ as /wɛt.sɔn/, and ‘leg’ /ˈlɛg/ as /lɛ.k/;
3) English /i/ was produced as /ɪ/, /ɛ/ and /i/, such as ‘injury’ /ˈɪn.ʃəri/ as /ʔɪn.te.mu.ɪli/, ‘bandage’ /ˈbændɪdʒ/ as /bænd.ɪ.dʒ/; ‘epistaxis’ /ˌɛˈpɪ.stæksɪs/ as /əˈpɪ.stæksɪs/, and ‘admit’ /ˈæd.mɪt/ as /ʔɛd.mɪt/;
4) English /ʊ/ was pronounced as /ʊ̯/ and /o/, such as ‘oxygen’ /ˈɒksɪdʒən/ as /ʔɔksɪdʒən/ and ‘thermometer’ /ˈθɜːm.ɔt.ɛr.ˈmɑːtər/ as /θɜːm.ɔt.ɛr.ˈmɑːtər/;
5) English /ʌ/ was replaced with /a/, such as ‘lumbar’ /ˈlʌmbər/ as /ləm.bər/;
6) English /u/ was produced with /u/ and /u/, such as ‘push’ /pʊʃ/ as /pʰu/, and ‘ambulance’ /ˈæmb.jʊˌləns/ as /ʔæm.ˈjʊ.ˌləns/.

The results above showed that most short vowels in English were replaced with Thai long vowels, i.e. English /æ/ with both /a/ and /æ/, English /e/ with /e/, English /i/ with /i/, English /ʊ/ with both /u/ and /ʊ/, and English /u/ with /u/. Many short vowels could be pronounced with more than one Thai sound, i.e. English /e/ with both /e/, /a/ and /ɛ/, English /i/ with /i/, /ɛ/ and /ɪ/, English /ʊ/ with both /u/ and /ʊ/, and English /ɛ/ with both /a/ and /ɛ/. The results from three vowels in English showed that they were replaced with the Thai vowels which were counterpart with one another, i.e. English /e/ with both /e/ and /ɛ/, English /i/ with both /i/ and /ɪ/, and English /ʊ/ with both /u/ and /ʊ/. The results that English /t/ was replaced with /t/ and English /s/ was replaced with /s/ are consistent with the findings in the study of Kitikanan (2020a) that L2 Thai learners mostly perceived English /t/ as Thai /t/, and English /s/ with /s/.
/ʌ/ was replaced with short vowel in Thai, suggesting that English /ʌ/ and /æ/ might be phonetically and articulatorily
closed in terms of duration of the vowels.

b. Long Vowels

Long vowels in English /iː, aː, ɔː, uː/ were produced as follows.
1) English /iː/ was realised as /iː/, such as ‘piece’ /piːs/ as /pʰiːt/;
2) English /aː/ was produced with /aː/, such as ‘observe’ /əbˈzɔːv/ as /ʔaːb.p.ʔɔːv/;
3) English /ɔː/ was articulated with /æː/ and /aː/, such as ‘mask’ /ma sk/ as /mæːt/ and ‘discharge’ /dɪ ʔiːdʒ/ as /diːt.ʔeːt/;
4) English /aː/ was realised as /aː/ and /aː/, such as ‘ward’ /wɔːrd/ as /wɔːt/ and ‘gauze’ /ɡɔːz/ as /kɔːt/;
5) English /uː/ was realised with /uː/ and /aː/, such as ‘tube’ /tjuːb/ as /təjw/, and ‘balloon’ /ba ˈluːn/ as /bo.n.luːn/.

For the production of English long vowels, most of them were produced with long vowels in Thai, i.e. English /iː/ with /iː/, English /aː/ with /aː/, English /ɔː/ with /æː/ and /aː/, and English /uː/ with /uː/. The result that English /aː/ was produced with /aː/ is in agreement with the finding in the study of Kitikanan (2020a) that L2 Thai learners mostly perceived English /aː/ as Thai /aː/.

In addition, the result that English /uː/ was produced with /uː/ is consistent with the finding in the study of Kitikanan (2020a) in the high-experienced group who mostly perceived this English vowel as similar to Thai /uː/.

c. Diphthongs

Regarding diphthongs in English /ai, ei, ai, ei, ao, au/, they were realised as follows.
1) English /ai/ was produced with /ai/, such as ‘palliative’ /ˈpæliətɪv/ as /pʰə.lai.tɪv/;
2) English /ea/ was realised as /æː/ and /œː/, such as ‘airway’ /ˈeərweɪ/ as /ʔeː.ʔeː/;
3) English /eu/ was articulated with /aː/ and /eː/, such as ‘nasal’ /ˈneɪzəl/ as /naː.sɒːl/ and ‘airway’ /ˈeərweɪ/ as /ʔeː.ʔeː/;
4) English /au/ was pronounced as /aːj/ and /ai/, such as ‘sign’ /ˈsɪɡn/ and ‘life’ /laɪf/ as /lai/;
5) English /oʊ/ was produced with /ɔː/ and /aː/, such as ‘void’ /vɔːd/ as /wɔːj/;
6) English /ʌʊ/ was realised with /eː/, such as ‘stroke’ /strəʊk/ as /sə.tʊːk/;
7) English /au/ was produced with /aːw/, such as ‘ground’ /ɡraʊnd/ as /kɔːw/.

From the results above, two out of three diphthongs ending with /ə/ were mostly substituted with the Thai vowel ending with /əj/, i.e. English /aːu/ as /aːj/ and English /æu/ as /ɔːj/. Two diphthongs ending with /ʌ/ were replaced with sounds with lip rounding, i.e. English /eʊ/ as /eː/ and English /æʊ/ as /aːw/. The result that English /au/ was realised as /aːw/ was contrastive to the finding that English /au/ was produced with a Thai vowel followed by the semi-vowel /j/ in the study of Nacaskul (1979).

B. Morphological Analysis

The second research question is: How do Thai nurses morphologically form English medical loanwords? In order to answer this question, analysis was carried out at the morphological level. With regards to the analysis at morphological level, seven strategies were found in the formation of English medical loanwords by Thai nurses as follows.

1) Keeping same word: In general, most English medical loanwords were pronounced with similar number of syllables, such as ‘content’ /ˈkɒntent/ as /kʰɔn.tʰɛnt/, ‘disease’ as /di.ˈsiːt/, and ‘balloon’ /ˈbəʊlən/ as /ˈbɔ.lən/.
2) Acronym: Sometimes, English medical loanwords could be articulated with acronym, such as ‘STEMI’ (S-T-Elevation Myocardial Infarction) as /ˈste.mi/ and ‘APACHE’ (acute physiology and chronic health evaluation) as /ˈə.pə.ˈkeɪʃən/.
3) Abbreviation: Thai nurses also employed abbreviation to pronounce English medical loanwords, such as ‘CPR’ as /ˈsiː.ˈpɜːr/ or ‘CD’ as /ˈsiːdi/.
4) Phrasal clipping: It was found that English medical loanwords could be clipped in the phrasal level, such as ‘pronouncing underlying disease’ as /ˈprəʊn.ˈdɑːsl.ˈleɪdʒ/; the word ‘disease’ was clipped in the word formation. However, this strategy was rare.
5) Back clipping and adding other sounds: Some English medical loanwords might be clipped at the back, such as ‘stethoscope’ as /ˈsteθ.kɔp/, and ‘respiratory’ as /ˈrɛsp.i.ˈtɔːri/.
6) Lengthening of abbreviation: Many abbreviations were found to be fully pronounced, such as ‘DOT’ (dead on table) as /ˈdɛt.ˌdɑːn.te.ˈəl/ and ‘U/S’ (ultrasound) as /ˈjuː.ˈɛs/.
7) Different pronunciations to distinguish words: This strategy was found to distinguish pairs of words that might cause confusion during the communication. For example, for ‘Atrial fibrillation’ and ‘Atrial flutter’, they could be abbreviated into ‘AF’. However, abbreviating them into ‘AF’ might cause confusion, so Thai nurses called ‘Atrial fibrillation’ as /ˈeɪ.ˈfɪb.rəl/ and ‘Atrial flutter’ as /ˈfɜːt.ˈflər/.

VI. Conclusion and Implication

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In summary, the production of English medical loanwords by Thai nurses seems to be influenced largely by L1 sounds. Many English sounds that exist in the Thai sound system were produced with Thai sounds that are phonemically similar to the English sounds. This might be due to positive transfer of the Thai sounds in the production of the English medical loanwords, such as pronouncing /h/ as unaspirated for the /h/ at the beginning of the word, and as unaspirated for the /h/ after /s/. In the same way, the production of English sounds that did not occur in the Thai sound system seems to be due to negative transfer of the Thai sounds, such as replacing English /v/ with Thai /w/. These findings support the concept of L1 transfer as agreed in many researchers. As negative transfer might cause confusion in communication, especially in the context requiring accuracy and speed, Thai nurses might be aware that some words might be pronounced the same, such as pronouncing ‘right’ /rait/ and ‘life’ /laif/ as /laif/. In this case, the context of speech or carrier phrase plays an important role in helping Thai nurses to understand each other.

This study also found that Thai nurses employed many strategies to form English medical loanwords, such as acronym, lengthening of abbreviation and phrasal clipping. It is interesting that even when constrained by time, some pronunciations were extended beyond the original words, such as pronouncing ‘DOT’ (dead on table) as /dɛt.tɔ.mɛːθɪs/, and ‘NSS’ (normal saline) /nɔː.mɛːsa.ˈlɛɪ/. Although Nacaskul (1979) mentioned that many personal names in English were changed into Thai words with humour, such as ‘(Mr.) Rankin’ as /ræŋ.kɪn/, this characteristic of word formation was not found in this study. It might be due to the environment in which the health provider work requires a high level of seriousness. This implies that the word formation of English medical loanwords by Thai nurses is rather different from that of English loanwords used by the general Thai population.

VII. LIMITATIONS AND FUTURE DIRECTIONS

This study has three main limitations. Firstly, the pronunciation of English medical loanwords in this study was based on the production of Thai nurses at Nopparat Rajathanee Hospital. Thai nurses at other hospitals might pronounce some words differently. For example, ‘ID’ is pronounced as abbreviation /ʔai.di/ for Thai nurses at Nopparat Rajathanee Hospital, but is fully produced as /ʔai.də/ for the ones at Chulalongkorn Hospital. Another example is from ‘ROM’ which is pronounced as /rəʊ.mət.ˈpɹəʊ.mə.tʃən.pɔ̝k.kæ.tɪl/ (‘regular range of motion’ in Thai) for Thai nurses at Nopparat Rajathanee Hospital, but as /rəʊ.mət.ˈpɹəʊ.mə.tʃən.pɔ̝k.kæ.tɪl/ (‘full range of motion’ in Thai) for the ones at Suananaree University of Technology Hospital. Future study might investigate the pronunciation of English medical loanwords by Thai nurses at other hospitals as compared with the one by Thai nurses at Nopparat Rajathanee Hospital in this study.

Secondly, as the data used in this study had no diphthong /ʌʊ, ɔɪ/ and /ɛɪ/ in initial position of the syllable, the investigation of these sounds in English medical loanwords by Thai nurses was limited. Further study might be carried out on the English medical loanwords by Thai nurses with these three sounds in the target words. It might be found that these three sounds were substituted with the Thai sounds similar to the ones used by general L2 Thai learners when pronouncing these English sounds.

The third limitation is on the analysis of the Thai tones in the loanwords. Although there were studies on tonal rules in English loanwords in Thai, this study was based on the production of Thai nurses at Nopparat Rajathanee Hospital. In addition, the analysis for tonal rules was not the focus of this study. For future research, it would be interesting to carry out an examination of the rules when using Thai tones in English medical loanwords by Thai nurses.

REFERENCES

[1] Azimi Lolaty, H., Ashktorab, T., Bagheri Nesami, M., & Bagherzadeh Ladari, R. (2011). Experience of professional communication among nurses working in educational hospitals: a phenomenological study. *Journal of Mazandaran university of medical sciences*, 21(85), 108-125.

[2] Best, C. T. (1995). A direct realist perspective on cross-language speech perception. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-language research* (pp. 171-204). Timonium, MD: York Press.

[3] Best, C. T., & Tyler, M. D. (2007). Nonnative and second-language speech perception: Commonalities and complementarities. In M. J. Munro & O.-S. Bohn (Eds.), *Second language speech learning: The role of language experience in speech perception and production* (pp. 13-34). Amsterdam: John Benjamins.

[4] Bickner, R. J. (1986). *Thai tones and English loanwords: a proposed explanation*. Paper presented at the Papers from a conference on Thai studies in honor of William J. Gedney.

[5] Chapman, K. B. (2009). Improving communication among nurses, patients, and physicians. *AJN The American journal of nursing, 109*(11), 21-25.

[6] Clopper, C. G. (2002). Frequency of stress patterns in English: A computational analysis. *IULC Working Papers Online, 2*(2), 1-9.

[7] Endarto, I. T. (2015). *Comparison between English loanwords in Thai and Indonesian: A comparative study in phonology and morphology*. Paper presented at the ASEAN/Asian Academic Society International Conference Proceeding Series.

[8] Flege, J. E. (1995). Second language speech learning: Theory, findings, and problems. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-language research* (pp. 233-277). Timonium, MD: York Press.

[9] Gandour, J. (1979). Tonal rules for English loanwords in Thai. In T. L. Thongkum, P. Kullavanijaya., P. V. Panupong, K. Tingsabadh.(Eds.), *Studies in Tai and Mon-Khmer Phonetics and Phonology in Honour of Eugénie J.A. Henderson* (pp. 94-105). Bangkok: Chulalongkorn University Press.
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