COMMENTARY

Linguistic Factors in Arabic for Miscommunication of Medication Names

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Abstract: A commentary and analysis on the miscommunication of medication names between native Arabic-speaking patients and pharmacists with a native English-speaking family physician using Medical English as a Lingua Franca (MELF), in a healthcare context. An important cause of communication difficulties is the different way native English and native Arabic speakers linguistically process medication names when using MELF. This is likely to be explained by the differences in the native grammars of English and Arabic which determine differences in pronunciation and predict potential error prone groupings of letters and sounds. This in turn leads to repeating linguistic errors such as epenthesis (insertion of additional vowels between consonants) and metathesis (the swapping of adjacent consonants). The article highlights a case where both epenthesis and metathesis occur simultaneously leading to a potential serious adverse event through a medication error and suggests further avenues of research to minimise such errors.

Keywords: medication errors, Arabic, metathesis, epenthesis, Medical English as a Lingua Franca, MELF

Introduction

As a General Practitioner (Family Physician) trained in the United Kingdom moving to Saudi Arabia was a unique formative experience, especially from a health communication point of view. It was late 2007 when I arrived to be introduced to a multicultural Family Medicine department on the ground floor of a large tertiary hospital in Jeddah, Saudi Arabia, serving staff and a large number of visiting patients who had no access to their primary care providers. Apart from the logistical challenges and finding a new rhythm to life one of the aspects of healthcare that I found myself increasingly fascinated with is the way medical English was used by non-native English speakers and the impact it has on communication.

Linguistic Transfer
Background

The first challenge I had was the difference in pronunciation of common medications. Once I was called by the pharmacy department to query a medication that I had prescribed. The conversation was in English, between myself as a native speaker and the pharmacist a native Arabic language speaker. I had prescribed an antibiotic for a skin infection but the particular antibiotic, "flucloxacillin", was not available. The pharmacist at the end of the phone asked what alternative I would like to prescribe. I decided to switch to a macrolide and promptly said, "Erythromycin". At the time

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I had no idea that what I was saying sounded very different on the other side of the phone. Using what I considered to be a standard universal pronunciation I said, phonetically speaking: [uh-ri-throw-MAI-sin].

I was surprised to hear that the tertiary care hospital pharmacy did not have that antibiotic either. I started to scratch my head wondering what had happened. I then moved on to the next macrolide in my repertoire: "Do you have clarithromycin?" or as it would have been heard, written phonetically, [kla-RITH-roe-MYE-sin]. The negative response made me increasingly puzzled. I then decided to turn the tables and ask the pharmacist what was available. I was surprised to hear the answers: "We have . . . ", and as it sounded to me on this side of the phone, [eRYTHRO-mysEEN] and [klaRYTHRO-mysEEN].

Over the next few months I increasingly adapted my ear and speech to mimic what I heard to improve the quality of our communication. This helped a lot and the time spent on the telephone decreased as the communication process became more reliable and quicker. This left me wondering what was happening?

Discussion

Arabic is a Semitic language based on a root structure. Nearly every word in Arabic is derived from a root word. Each root word is three or four letters long. New words with new meanings are formed by changes to the root through a process of doubling root letters or adding a limited number of non-root letters in defined positions ie darasa "to study" if the middle root letter is doubled to darrasa the meaning would change "to teach". The addition of prefixes and suffixes rarely change the core meaning of a word but are used to produce slight changes such as indicating plurality ie mudarris "teacher" and mudarriseen "teachers".[1] One of the consequences of this method of forming words is that the central core of a word is seen as a single phonetic sound or syllable and the common prefixes and suffixes as natural and separate syllables, which explained the difference in pronunciation I was hearing. This insight helped me appreciate the underlying nature for our differences in pronunciation and helped predict when communication errors were likely to happen.

Linguistic Interference
Background

On the other hand, communicating with patients had its own unique linguistic challenge, especially when combined with the geographical context of where I worked. My hospital served towns and villages up and down the entire 1600 Km western coast. I regularly had patients with limited medical histories, referred to our department from specialist colleagues for their primary care needs. Occasionally, patients would carry lists of their medication, but frequently patients relied on their memories trying to recall their prescribed medications that had been forgotten at home or had run out during their stay in Jeddah. It was during these consultations that I started to see a repeated pattern of errors when recalling the names of their medications.

An example that illustrates this well was of a hypertensive diabetic patient. The patient was taking a calcium channel antagonist called "amlor" (amlodipine) and a sulphonlyurea called "amaryl" (glimepiride). The patient was taking both medications but had run out one of the two. He asked for a prescription of "amlor" or as he said it [ama-loor]. The patient pronounced the word with an additional /a/ in the middle of the word, which was confusing. I attempted to clarify by saying [AM-lor], without the additional /a/ sound, but my response only succeeded in making that patient more confused as he was wondering why I dropped the extra /a/ sound. The patient then repeated his request saying "[ama-rool]", now switching the last two consonants, the "r" and "l", which now made the antihypertensive "amlor" sound like "amaryl", a sulphonylurea! What should have been a short consultation became increasingly longer and equally frustrating for both of us. The consultation outcome, I would learn later that day, was dysfunctional as an irate patient returned having stood in the long outpatient pharmacy queue only to find that I had prescribed the medication he did not need. Had the patient not spotted the error the additional hypoglycaemic agent had the potential to induce significant hypoglycaemic morbidity.

Discussion

The case nicely illustrates two linguistic transformations that my Arabic native speaking patients were subconsciously using when pronouncing medication names. First, the addition of a vowel between consonants is what linguists call epenthesis. Second, the swapping of two adjacent consonants, known as metathesis.

English allows the presence of certain pairs of serial consonants in words such as "amlor", "metformin", "ciprofloxacin" etc. Where adjacent pairs of consonants are not said as a single sound English speakers deal with this by dividing the word into syllables at this boundary. This is known as the

Maximal Onset Principle, a linguistic principle that states speakers prefer to maximise the number of consonants at the beginning of syllables. In English the word "apron" is read as [a-prun] and not as [ap-run] as /pr/ is an allowed consonant combination in English. On the other hand, the word "captain" is pronounced as [cap-tIn] rather than [ca-ptIn] as the phoneme /pt/ is not valid initial consonant combination in English.[2] This equally applies to native English speakers dealing with drug names who would pronounce "metformin" as [met-for-min] as the consonant combinations of /tf/ and /rm/ are not said in English. Arabic on the other is much more restrictive with combining consonants and does not allow the presence of two serial consonants. This is why Arabic speakers when pronouncing terms where there is a combination of consonants will naturally resort to epenthesis, injecting a vowel between the consonants. This is why names such as "amlor", "metformin" are said by native Arabic speakers with an additional vowel [ama-lor] and [meta-fora-min].

Metathesis, the second linguistic transformation being used by patients - where adjacent consonants in a word are swapped - is uncommon in English. The metathesis database notes that this occurs in other languages but the inter-language frequency of its occurrence is not mentioned.[3] In English, metathesis has been viewed by linguists as a "sporadic" and "marginal process".[4] On the other hand, the frequency of metathesis in Arabic is well recognised, frequently seen in children and commonly found in modern spoken Arabic dialects.[4] Linguists think the reason metathesis is more common in Arabic is its root based structure. This reduces the number of constraints on the way sounds can combine, which is not the case in English. The higher frequency of common prefixes and suffixes when combined with the root structure allows for greater ease of metathesis as the word still sounds natural.[4]

Conclusion

Pharmaceutical companies with a global presence usually develop their brand names under the guidance of regulating agencies in a milieu of English native speakers. When the medication is introduced internationally native speakers respond to the new names with the phonological rules of their native language. This process can have unintended consequences and impact the clarity of communication between patients and their health care providers. The growing number of patients on long term medication as

the population ages, a growing formulary giving rise to a plethora of new names and an increasing mix of native and non-native speakers of English in healthcare settings has the potential to induce communication errors where mitigating strategies are not implemented.

The growing field of study aiming to identify and reduce communication errors in this area is known as Medical English as a Lingua Franca (MELF). It builds on the general field, English as a Lingua Franca (ELF), which to date has mainly concentrated on the domains of higher education and business. One of the directions of MELF research is to develop practical strategies to enhance the immediacy of communication and precision.[5] This opinion piece highlights communication errors occurring where the medium of communication is oral-aural. Another potentially significant source of miscommunication arises from the visual processing of look-alike and sound-alike (LASA) drug names.[6] Algorithm-based methods such as the Levenshtein edit distance (LED) are used to identify potentially confusable names. The ability of such algorithms to identify confusable drug names in Arabic and English is a required area of further research. The challenge of developing a useful bi-lingual algorithm is further increased as Arabic orthography does not usually code for short vowel sounds, unlike English.

Disclosure

The author reports no conflicts of interest in this work.

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