# AMHARIC

# Annotation Guideline for Labelling Machine Translation Error in Health Care.

In the absence of human translators, physicians rely on Machine Translation tools to communicate with patients who do not speak the same language(s) as them. Errors in machine translated text may then result in clinical harm. We are working on a project to design interventions that reduce clinical harm in machine translated text when used to communicate with patients. This document is to serve as an annotation guideline for labelling errors in machine translated text in the healthcare context. The document includes definitions of labels, examples of annotations, and step-by-step annotation with screenshots.

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# Background

Language barriers between patients and physicians affect quality of care. Ideally, doctors can reach professional interpreters, either in person or through phone lines to help convey information to patients. In some cases, bilingual staff of family members are used as translators. However, in circumstances where there are no human interpreters, professional or not, available, doctors may rely on machine translation tools.

While machine translated text may have several different types of errors, in this context errors will may lead to patient harm. In this work, we are interested in designing and testing interventions that reduce clinical harm of machine translated text by paraphrasing source sentences. To test our intervention, we first need annotated dataset of machine translated text to identify sentences with errors that cause clinical harm.

# Data

The source text are extracted from discharge instructions taken from the DischargeMe dataset(Xu, J. 2024) which includes de-identified discharge instructions from Beth Israel Deaconess Medical Centre (BIDMC) in Boston MA, USA.

The target text are outputs of machine translation systems. Since discharge instructions are instructions given to patients at the time they are discharged from the hospital, the source may include the following information: chief compliant, actual diagnosis, medication list, follow-up items, and in some cases call back number (DeSai, C. et al. 2021).

# Scenario

The patients do not speak the source language (English) and the doctors or medical practitioners do not speak the target language (Amharic). During annotation, keep in mind that the patient is only provided with the machine translated text.

# Annotation Scheme

While machine translation might produce several different errors, in this context we are interested in **errors that have clinical consequences**. Hence, you will be annotating across two axis: adequacy and clinical significance.

## Translation Adequacy

This axis is to measure whether or not the translation accurately conveys the meaning of the source text. This will be a yes or no label.

### Examples of Adequate Translations

1. A translation can be adequate if it correctly conveys the meaning even in situations where a direct translation of a word may not exist in the target language. For instance in this example, there is no direct translation for the word dehydration, but the translation preserves the meaning of the sentence.

> **Source:** "You were admitted to the hospital for dehydration and shortness of breath."
>
> **Translation:** "ውሃ እጥረት እና ልትንፋሽ ማጣር ወደ ሆስፒታል ገብተሃል::"
>
> (You were admitted to the hospital for shortness of breath and lack of water.)
>
> **Is this translation adequate? :** Yes.

2. A translation may be adequate even if it has errors in the translation but preserves the meaning. For instance, the example below (1) uses the male gender in the sentences even though it starts by correctly translating Mrs, (2) has an awkward translation for the phrase "deep breath." But it can still be adequate if the errors do not affect the patient's care.

> **Source:** "Dear Mrs. __ your shortness of breath could be because of inability to take deep breaths."
>
> **Translation:** "ውድ ወ/ሮ __ የትንፋሽ እጥረት ያጋጠመህ ኃይለኛ እስትንፋስ መውሰድ ባለመቻል ምክንያት ሊሆን ይችላል::"
>
> (Dear Mrs __ you(male) might have experienced shortness of breath because you(male) could not take powerful breaths)
>
> **Is this translation adequate? :** Yes

## Examples of Inadequate Translations

1. A translation is inadequate if it significantly alters the meaning of the source sentence. For instance, the translation below is the opposite of the source sentence.

> **Source:** "You were not having a heart attack."
>
> **Translation:** "የልብ ደካም ይዞሀ ነበር::"
>
> (You had a heartattack.)
>
> **Is this translation adequate? :** No

2. A translation may also be inadequate if it the error shifts the meaning of the sentence. For instance, in the example below, the translation includes a mistranslation of the phrase "wean off" which entirely shifts the meaning of the translation.

> **Source:** "Aim to wean off this medication in a week ."
>
> **Translation:** "ይህንን መድሀኒት በአንድ ሳምንት ውስጥ ጡት ለማጥፋት ዓላማ ያድርጉ::"
>
> (For this medication, plan to irradicate breasts with in one week)
>
> **Is this translation adequate? :** No

## Clinical Risk

For this axis, we will use a 5 point scale with varying degrees of clinical harm derived from (Nápoles, A. M., et al. 2015). We provide the definitions of each of the labels in the scale with accompanying examples.

| Severity level | Definition | Example |
|---|---|---|
| Life-Threatening | Error that may put the life of a patient in danger. | Telling a patient to stop taking a medication when the source says to keep taking it, errors in dosage or mistranslations in when a patient should come back to the ER etc. |
| High | Errors that may not lead to life threatening situations but may lead | For example, mistranslating body parts and symptoms in relation |

| | | |
|---|---|---|
| | the patient to misunderstand the care they had received. | to a procedure (e.g. translating "wait until we remove your staples" to "wait until we remove your ankles") |
| Moderate | Errors that may not have significant medical effects but still cause confusions | For example having unclear descriptions of what procedures were performed and by whom they were performed. |
| Mild | Errors with minimal medical effects. | For example, misgendering the patient while a significant error overall may not have significant medical consequences. |
| Insignificant | Stylistic errors. | For example, the meaning is preserved accurately but the text feels awkward. (e.g. translating "deep breath" to "powerful breath" when an exact translation for the term exists. |

## Step-By-Step Annotation

You will find a spreadsheet with the source and target sentences along with two columns for annotating Adequacy and Severity. There is an additional third column for comments if you wish to elaborate on your annotation.

1. Step 1: Label for adequacy of a translation by looking at the target and the source sentence and selecting Yes or No from the drop down.

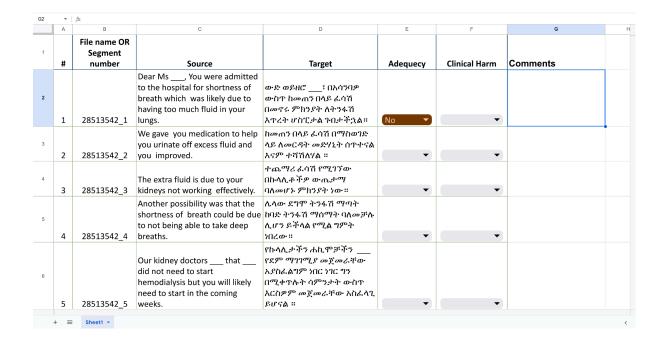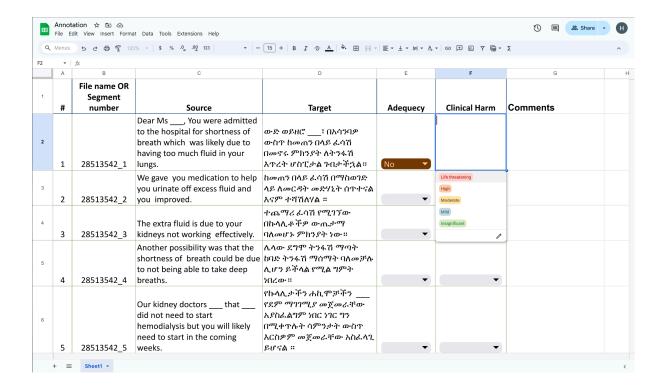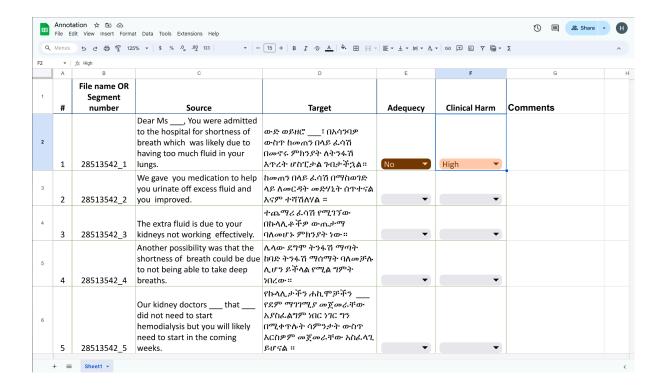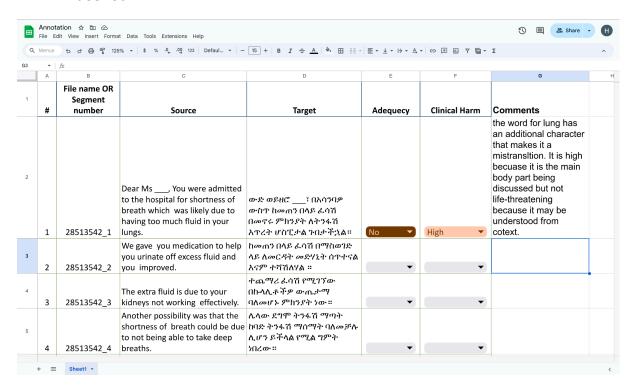| # | File name OR Segment number | Source | Target | Adequecy | Clinical Harm | Comments |
|---|---|---|---|---|---|---|
| 1 | 28513542_1 | Dear Ms ___, You were admitted to the hospital for shortness of breath which was likely due to having too much fluid in your lungs. | ውድ ወይዘሮ ___፣ በእሳንባዎ ውስጥ ከመጠን በላይ ፈሳሽ በመኖሩ ምክንያት ለትንፋሽ እጥረት ሆስፒታል ገብታችኋል። | No | | |
| 2 | 28513542_2 | We gave you medication to help you urinate off excess fluid and you improved. | ከመጠን በላይ ፈሳሽ በማስወገድ ላይ ለመርዳት መድሃኒት ሰጥተናል እናም ተሻሽለሃል ። | | | |
| 3 | 28513542_3 | The extra fluid is due to your kidneys not working effectively. | ተጨማሪ ፈሳሽ የሚገኘው በኩላሊቶችዎ ውጤታማ ባለመሆኑ ምክንያት ነው። | | | |
| 4 | 28513542_4 | Another possibility was that the shortness of breath could be due to not being able to take deep breaths. | ሌላው ደግሞ ትንፋሽ ማጣት ከበድ ትንፋሽ ማሰማት ባለመቻሉ ሊሆን ይችላል የሚል ግምት ነበረው። | | | |
| 5 | 28513542_5 | Our kidney doctors ___ that ___ did not need to start hemodialysis but you will likely need to start in the coming weeks. | የኩላሊታችን ሐኪሞቻችን ___ የደም ማጣሪያ መጀመራቸው አያስፈልግም ነበር ነገር ግን በሚቀጥሉት ሳምንታት ውስጥ እርስዎም መጀመራቸው አስፈላጊ ይሆናል ። | | | |

2. Step 2: Label for clinical harm by selecting from the drop down.

Annotation

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| # | File name OR Segment number | Source | Target | Adequecy | Clinical Harm | Comments |
|---|---|---|---|---|---|---|
| 1 | 28513542_1 | Dear Ms ___, You were admitted to the hospital for shortness of breath which was likely due to having too much fluid in your lungs. | ውድ ወይዘሮ ___፣ በእሳንባዎ ውስጥ ከመጠን በላይ ፈሳሽ በመኖሩ ምክንያት ለትንፋሽ እጥረት ሆስፒታል ገብታችኋል። | No | | |
| 2 | 28513542_2 | We gave you medication to help you urinate off excess fluid and you improved. | ከመጠን በላይ ፈሳሽ በማስወገድ ላይ ለመርዳት መድሃኒት ሰጥተናል እናም ተሻሽለሃል ። | | Life threatening / High / Moderate / Mild / Insignificant | |
| 3 | 28513542_3 | The extra fluid is due to your kidneys not working effectively. | ተጨማሪ ፈሳሽ የሚገኘው በኩላሊቶችዎ ውጤታማ ባለመሆኑ ምክንያት ነው። | | | |
| 4 | 28513542_4 | Another possibility was that the shortness of breath could be due to not being able to take deep breaths. | ሌላው ደግሞ ትንፋሽ ማጣት ከበድ ትንፋሽ ማሰማት ባለመቻሉ ሊሆን ይችላል የሚል ግምት ነበረው። | | | |
| 5 | 28513542_5 | Our kidney doctors ___ that ___ did not need to start hemodialysis but you will likely need to start in the coming weeks. | የኩላሊታችን ሐኪሞቻችን ___ የደም ማጣሪያ መጀመራቸው አያስፈልግም ነበር ነገር ግን በሚቀጥሉት ሳምንታት ውስጥ እርስዎም መጀመራቸው አስፈላጊ ይሆናል ። | | | |

3. Step 3 (optional) : Add additional comments about your annotation in the box if desired.

A full annotation would look like this:

| # | File name OR Segment number | Source | Target | Adequecy | Clinical Harm | Comments |
|---|---|---|---|---|---|---|
| 1 | 28513542_1 | Dear Ms ___, You were admitted to the hospital for shortness of breath which was likely due to having too much fluid in your lungs. | ውድ ወይዘሮ ___፣ በአሳንባዎ ውስጥ ከመጠን በላይ ፈሳሽ በመኖሩ ምክንያት ለትንፋሽ እጥረት ሆስፒታል ገብታችኋል። | No | High | the word for lung has an additional character that make it a mistranslation but it can somewhat be understood from context |
| 2 | 28513542_2 | We gave you medication to help you urinate off excess fluid and you improved. | ከመጠን በላይ ፈሳሽ በማስወገድ ላይ ለመርዳት መድሃኒት ሰጥተናል እናም ተሻሽለሃል ። | Yes | Mild | |
| 3 | 28513542_3 | The extra fluid is due to your kidneys not working effectively. | ተጨማሪ ፈሳሽ የሚገኘው በኩላሊቶችዎ ውጤታማ በሆነ ምክንያት ነው። | Yes | Moderate | |
| 4 | 28513542_4 | Another possibility was that the shortness of breath could be due to not being able to take deep breaths. | ሌላው ደግሞ ትንፋሽ ማጣት ከባድ ትንፋሽ ማሰማት በለመቻሉ ሊሆን ይችላል የሚል ግምት ነበረው። | No | High | taking deep breath is translated to making heavey breathing sounds |
| 5 | 28513542_5 | Our kidney doctors ___ that ___ did not need to start hemodialysis but you will likely need to start in the coming weeks. | የኩላሊታችን ሐኪሞቻችን ___ የደም ማገገሚያ መጀመራቸው አያስፈልግም ነበር ነገ ግን በሚቀጥሉት ሳምንታት ውስጥ እርስዎም መጀመራቸው አስፈላጊ ይሆናል ። | No | Life threatening | hemodialysis was mistranslated to blood recovery making it unclear what the patient needs to do in the coming week |

# References

Xu, J. (2024). Discharge Me: BioNLP ACL'24 Shared Task on Streamlining Discharge Documentation (version 1.3). *PhysioNet*. https://doi.org/10.13026/Ozf5-fx50.

Nápoles, A. M., Santoyo-Olsson, J., Karliner, L. S., Gregorich, S. E., & Pérez-Stable, E. J. (2015). Inaccurate Language Interpretation and Its Clinical Significance in the Medical Encounters of Spanish-speaking Latinos. *Medical care*, *53*(11), 940–947. https://doi.org/10.1097/MLR.0000000000000422

DeSai, C., Janowiak, K., Secheli, B., Phelps, E., McDonald, S., Reed, G., & Blomkalns, A. (2021). Empowering patients: simplifying discharge instructions. *BMJ open quality*, *10*(3), e001419. https://doi.org/10.1136/bmjoq-2021-001419