

# TIGRINYA

## 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 or 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 complaint, 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 (Tigrinya). 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:** “ማይ ምውሐድን ሕጽረት ትንፋስን ዝለዘጋጠመካ ናብ ሆስፒታል ተወስድኻ”

(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:** “ክብርቲ ወይዘሮ \_\_\_ ሕጽረት ትጎፋሰካ ብሰንኪ ዓሚኽ ትጎፋሰ ክትወስድ ዘይምኽኣል ክኸውን ይኽእል እዩ።”

(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:** “ወቕዒ ልቢ ነይሩካ ነይሩ።”

(You had a heart attack.)

**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:** “ድሕሪ ሓደ ሰውን ነዚ መድሃኒት ጡብ ከተቋርጸ ዕላማ ግበር።”

(For this medication, plan to irradiate 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 the patient to misunderstand the care they had received.	For example, mistranslating body parts and symptoms in relation 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.

A	B	C	D	E	F	G
#	File name OR Segment number	Source	Target	Adequacy	Clinical Harm	Comments
1	22129218_6	If the VAC is not functioning (beeping or loss of suction) the dressing can be removed and a normal saline damp to dry dressing placed to the wound until the VAC can be replaced.	እቲ VAC ዘይሰርሕ እንተ ኹይኑ (ብፒፕ ወይ ናይ ምስትጎፋስ ምጥፍላት) እቲ ክዳን ክውጽእ ይኽእል እዩ፣ እቲ VAC ኽተተተኪእ ክሳብ ዚመጽእ ድማ ሓዲ ንቡር ጨና ንኡስ ክዳን ናብ ቁስሊ ይቕርብ።	<input type="text"/>	<input type="text"/>	
2	23252015_10	The final pathology reports from the biopsies taken during endoscopy and colonoscopy are still pending.	ናይ መወዳእታ ጽብጻባት ናይ'ቲ ኣብ እዋን ኢንዶስኮፒን ኮሎኖስኮፒን ዝተወሰዱ ናይ ባዮፕሲ ምርመራታት ገና ኣይተረኽቡን።	<input type="text"/>	<input type="text"/>	
3	23252015_16	We ran several tests to determine if your vitamin-B12 deficiency could be related to malabsorptive diseases called celiac disease and pernicious anemia.	ናይ ሽይታሚን-ቢ 12 ጉድለትካ ምስ ናይ ስሊኣክ ሕማም (celiac disease) ከምኡውን ምስ ዘስዕበ ጸገማት ርክብ ክህልዎ ይኽእል ድዩ ዝብል ንምርግጽ ዝተፈላለዩ መርመራታት ገበርና።	<input type="text"/>	<input type="text"/>	
4	23252015_2	You were admitted for diarrhea and dehydration.	ብሰንኪ ስርናይን ውሕጅን ሕክምናዊ ሓገዝካ ተቐቢልካ።	<input type="text"/>	<input type="text"/>	
5	23252015_3	For your diarrhea, we did several tests on your stool and found no infectious cause of your diarrhea.	ንምንዝርናኻ፡ ኣብ ፈስቲኽ እተፈላለዩ መርመራታት ኒርናዮ፡ ናይ ምብትኽር ተላባዒ ምኽንያት ከኣ ኣይረኽብናን ኢና።	<input type="text"/>	<input type="text"/>	

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.

A	B	C	D	E	F	G
#	File name OR Segment number	Source	Target	Adequacy	Clinical Harm	Comments
1	22129218_6	If the VAC is not functioning (beeping or loss of suction) the dressing can be removed and a normal saline damp to dry dressing placed to the wound until the VAC can be replaced.	እቲ VAC ዘይሰርሕ እንተ ኹይኑ (ብፒፕ ወይ ናይ ምስትጓፋስ ምጥፍላት) እቲ ክዳን ክወጽእ ይኽእል እዩ፣ እቲ VAC ኸተተተኪእ ክሳብ ዚመጽእ ድማ ሓዲ ንቡር ጨና ንኡስ ክዳን ናብ ቁስሊ ይቕርብ።			
2	23252015_10	The final pathology reports from the biopsies taken during endoscopy and colonoscopy are still pending.	ናይ መወዳእታ ጽብጻባት ናይ'ቲ ኣብ እዋን ኢንዶስኮፒን ኮሎኖስኮፒን ዝተወሰዱ ናይ ባዮፕሲ ምርመራታት ገና ኣይተረኽቡን።	<div> No Yes </div>		
3	23252015_16	We ran several tests to determine if your vitamin-B12 deficiency could be related to malabsorptive diseases called celiac disease and pernicious anemia.	ናይ ሽይታሚን-ቢ 12 ጉዳላትካ ምስ ናይ ስሊኣክ ሕማም (celiac disease) ከምኡውን ምስ ዘስዕበ ጸገማት ርክብ ክህልዎ ይኽእል ድዩ ዝብል ንምርግጋጽ ዝተፈላለዩ መርመራታት ገበርና።			
4	23252015_2	You were admitted for diarrhea and dehydration.	ብሰንኪ ስርናይን ውሕጅን ሕክምናዊ ሓገዝካ ተቐቢልካ።			
5	23252015_3	For your diarrhea, we did several tests on your stool and found no infectious cause of your diarrhea.	ንምንዝርናኹ፡ ኣብ ፈስቲኽ እተፈላለዩ መርመራታት ገርናዮ፡ ናይ ምብትኽር ተላባዒ ምኽንያት ከኣ ኣይረኽብናን ኢና።			
		You had an endoscopy which showed that your esophagus and stomach lining were inflamed; this is	እቲ ናይ ምቕራጽ ኣካላትካን ናይ ምቕራጽ ኣካላትካን ኮሎን ብሕሳብ ይገልጹልኩም።			

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2	23252015_10	The final pathology reports from the biopsies taken during endoscopy and colonoscopy are still pending.	ናይ መወዳእታ ጽብጻባት ናይ'ቲ ኣብ እዋን ኢንዶስኮፒን ኮሎኖስኮፒን ዝተወሰዱ ናይ ባዮፕሲ ምርመራታት ገና ኣይተረኽቡን።			
3	23252015_16	We ran several tests to determine if your vitamin-B12 deficiency could be related to malabsorptive diseases called celiac disease and pernicious anemia.	ናይ ሽይታሚን-ቢ 12 ጉዳላትካ ምስ ናይ ስሊኣክ ሕማም (celiac disease) ከምኡውን ምስ ዘስዕበ ጸገማት ርክብ ክህልዎ ይኽእል ድዩ ዝብል ንምርግጋጽ ዝተፈላለዩ መርመራታት ገበርና።			
4	23252015_2	You were admitted for diarrhea and dehydration.	ብሰንኪ ስርናይን ውሕጅን ሕክምናዊ ሓገዝካ ተቐቢልካ።			
5	23252015_3	For your diarrhea, we did several tests on your stool and found no infectious cause of your diarrhea.	ንምንዝርናኹ፡ ኣብ ፈስቲኽ እተፈላለዩ መርመራታት ገርናዮ፡ ናይ ምብትኽር ተላባዒ ምኽንያት ከኣ ኣይረኽብናን ኢና።			

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



A	B	C	D	E	F	G
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1	22129218_6	If the VAC is not functioning (beeping or loss of suction) the dressing can be removed and a normal saline damp to dry dressing placed to the wound until the VAC can be replaced.	እቲ VAC ዘይሰርሕ እንተ ኹይት (ብፒፕ ወይ ናይ ምስትንፋስ ምጥፍላት) እቲ ክዳን ክወጽእ ይኽእል እዩ፣ እቲ VAC ኽተተተኪእ ክሳብ ዚመጽእ ድማ ሓዲ ንቡር ጨና ንኡስ ክዳን ናብ ቁስሊ ይቕርብ።	No		
2	23252015_10	The final pathology reports from the biopsies taken during endoscopy and colonoscopy are still pending.	ናይ መወዳእታ ጸብጻባት ናይ'ቲ ኣብ እዋን ኢንዶስኮፒን ኮሎኖስኮፒን ዝተወሰዱ ናይ ባዮፕሲ ምርመራታት ገና ኣይተረኽቡን።			
3	23252015_16	We ran several tests to determine if your vitamin-B12 deficiency could be related to malabsorptive diseases called celiac disease and pernicious anemia.	ናይ ሽይታማን-ቢ 12 ጉድለትካ ምስ ናይ ስሊኣክ ሕማም (celiac disease) ከምኡውን ምስ ዘስዕበ ጸገማት ርክብ ክህልዎ ይኽእል ድዩ ዝተብል ንምርግገጽ ዝተፈላለዩ መርመራታት ገበርና።			
4	23252015_2	You were admitted for diarrhea and dehydration.	ብሰንኪ ስርናይን ውሕጅን ሕክምናዊ ሓገዝካ ተቐቢልካ።			
5	23252015_3	For your diarrhea, we did several tests on your stool and found no infectious cause of your diarrhea.	ንምንዝርናኻ፡ ኣብ ፈስቲኽ እተፈላለዩ መርመራታት ፒርናዮ፡ ናይ ምብትኽር ተላባዒ ምኽንያት ከኣ ኣይረኽብናን ኢና።			

Life threatening

High

Moderate

Mild

Insignificant

A	B	C	D	E	F	G
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1	22129218_6	If the VAC is not functioning (beeping or loss of suction) the dressing can be removed and a normal saline damp to dry dressing placed to the wound until the VAC can be replaced.	እቲ VAC ዘይሰርሕ እንተ ኹይት (ብፒፕ ወይ ናይ ምስትንፋስ ምጥፍላት) እቲ ክዳን ክወጽእ ይኽእል እዩ፣ እቲ VAC ኽተተተኪእ ክሳብ ዚመጽእ ድማ ሓዲ ንቡር ጨና ንኡስ ክዳን ናብ ቁስሊ ይቕርብ።	No	High	
2	23252015_10	The final pathology reports from the biopsies taken during endoscopy and colonoscopy are still pending.	ናይ መወዳእታ ጸብጻባት ናይ'ቲ ኣብ እዋን ኢንዶስኮፒን ኮሎኖስኮፒን ዝተወሰዱ ናይ ባዮፕሲ ምርመራታት ገና ኣይተረኽቡን።			
3	23252015_16	We ran several tests to determine if your vitamin-B12 deficiency could be related to malabsorptive diseases called celiac disease and pernicious anemia.	ናይ ሽይታማን-ቢ 12 ጉድለትካ ምስ ናይ ስሊኣክ ሕማም (celiac disease) ከምኡውን ምስ ዘስዕበ ጸገማት ርክብ ክህልዎ ይኽእል ድዩ ዝተብል ንምርግገጽ ዝተፈላለዩ መርመራታት ገበርና።			
4	23252015_2	You were admitted for diarrhea and dehydration.	ብሰንኪ ስርናይን ውሕጅን ሕክምናዊ ሓገዝካ ተቐቢልካ።			
5	23252015_3	For your diarrhea, we did several tests on your stool and found no infectious cause of your diarrhea.	ንምንዝርናኻ፡ ኣብ ፈስቲኽ እተፈላለዩ መርመራታት ፒርናዮ፡ ናይ ምብትኽር ተላባዒ ምኽንያት ከኣ ኣይረኽብናን ኢና።			

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

A	B	C	D	E	F	G
#	File name OR Segment number	Source	Target	Adequacy	Clinical Harm	Comments
1	22129218_6	If the VAC is not functioning (beeping or loss of suction) the dressing can be removed and a normal saline damp to dry dressing placed to the wound until the VAC can be replaced.	እቲ VAC ዘይሰርሕ እንተ ኹይኑ (ብፒፕ ወይ ናይ ምስትጎፋስ ምጥፍኣት) እቲ ክዳን ክወጽእ ይኽእል እዩ፣ እቲ VAC ኽተተተኩእ ክሳብ ዚመጽእ ድማ ሓይ ንቡር ጨና ንኡስ ክዳን ናብ ቁስሊ ይቐርብ።	No	Life threat...	The word replaced is mistranslated, which makes the sentence a bit unclear. The <b>saline</b> mistranslation translated to a completely wrong word, which tells the patient to put something else on the wound that might be life-threatening.
2	23252015_10	The final pathology reports from the biopsies taken during endoscopy and colonoscopy are still pending.	ናይ መወዳእታ ጸብጻባት ናይ 'ቲ ኣብ እዋን ኢንዶስኮፒን ኮሎኖስኮፒን ዝተወሰደ ናይ ባዮፕሲ ምርመራታት ገና ኣይተረኽቡን።			
3	23252015_16	We ran several tests to determine if your vitamin-B12 deficiency could be related to malabsorptive diseases called celiac disease and pernicious anemia.	ናይ ሽይታሚን-ቢ 12 ጉድለትካ ምስ ናይ ስሊኣክ ሕማም (celiac disease) ከምኡውን ምስ ዘስዕበ ጸገማት ርክብ ክህልዎ ይኽእል ድዩ ዝብል ንምርግጋጽ ዝተፈለለዩ ምርመራታት ገበርና።			
4	23252015_2	You were admitted for diarrhea and dehydration.	ብሰንኪ ስርናይን ውሕጅን ሕክምናዊ ሓገዝካ ተቐቢልካ።			
5	23252015_3	For your diarrhea, we did several tests on your stool and found no infectious cause of your diarrhea	ንምንገርናኻ፡ ኣብ ፈስቲኽ እተፈለለዩ ምርመራታት ገርናዮ፡ ናይ ምብትኻር ተለባዓ ምኽንያት ከኣ ኣይረኽብናን ኣና።			

A full annotation would look like this:

A	B	C	D	E	F	G
#	File name OR Segment number	Source	Target	Adequacy	Clinical Harm	Comments
1	22129218_6	If the VAC is not functioning (beeping or loss of suction) the dressing can be removed and a normal saline damp to dry dressing placed to the wound until the VAC can be replaced.	እቲ VAC ዘይሰርሕ እንተ ኹይኑ (ብፒፕ ወይ ናይ ምስትጎፋስ ምጥፍኣት) እቲ ክዳን ክወጽእ ይኽእል እዩ፣ እቲ VAC ኽተተተኩእ ክሳብ ዚመጽእ ድማ ሓይ ንቡር ጨና ንኡስ ክዳን ናብ ቁስሊ ይቐርብ።	No	Life threat...	The word replaced is mistranslated, which makes the sentence a bit unclear. The saline mistranslation translated to a completely wrong word, which tells the patient to put something else on the wound that might be life-threatening.
2	23252015_10	The final pathology reports from the biopsies taken during endoscopy and colonoscopy are still pending.	ናይ መወዳእታ ጸብጻባት ናይ 'ቲ ኣብ እዋን ኢንዶስኮፒን ኮሎኖስኮፒን ዝተወሰደ ናይ ባዮፕሲ ምርመራታት ገና ኣይተረኽቡን።	No	Moderate	
3	23252015_16	We ran several tests to determine if your vitamin-B12 deficiency could be related to malabsorptive diseases called celiac disease and pernicious anemia.	ናይ ሽይታሚን-ቢ 12 ጉድለትካ ምስ ናይ ስሊኣክ ሕማም (celiac disease) ከምኡውን ምስ ዘስዕበ ጸገማት ርክብ ክህልዎ ይኽእል ድዩ ዝብል ንምርግጋጽ ዝተፈለለዩ ምርመራታት ገበርና።	No	Moderate	
4	23252015_2	You were admitted for diarrhea and dehydration.	ብሰንኪ ስርናይን ውሕጅን ሕክምናዊ ሓገዝካ ተቐቢልካ።	No	High	
5	23252015_3	For your diarrhea, we did several tests on your stool and found no infectious cause of your diarrhea.	ንምንገርናኻ፡ ኣብ ፈስቲኽ እተፈለለዩ ምርመራታት ገርናዮ፡ ናይ ምብትኻር ተለባዓ ምኽንያት ከኣ ኣይረኽብናን ኣና።	No	High	

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