

Annotating Question Types for Consumer Health Questions

Kirk Roberts, Kate Masterton, Marcelo Fiszman, Halil Kılıçoğlu, and
Dina Demner-Fushman
U.S. National Library of Medicine

31 May 2014

Consumer QA @ NLM

- NLM customer service receives hundreds of questions per day on a variety of topics.
 - Library services
 - PubMed
 - ClinicalTrials.gov
- Dozens of these questions are *consumer health questions*
 - Non-experts asking for medical information
 - Disclaimer: NLM cannot diagnose or replace advice of physician. NLM can connect consumers with information on NLM services.

Consumer QA @ NLM

- NLM customer service receives hundreds of questions per day on a variety of topics.
 - Library services
 - PubMed
 - ClinicalTrials.gov
- Dozens of these questions are *consumer health questions*
 - Non-experts asking for medical information
 - Disclaimer: NLM cannot diagnose or replace advice of physician. NLM can connect consumers with information on NLM services.

Consumer QA @ NLM

- NLM customer service receives hundreds of questions per day on a variety of topics.
 - Library services
 - PubMed
 - ClinicalTrials.gov
- Dozens of these questions are *consumer health questions*
 - Non-experts asking for medical information
 - Disclaimer: NLM cannot diagnose or replace advice of physician. NLM can connect consumers with information on NLM services.

Consumer QA @ NLM

- NLM customer service receives hundreds of questions per day on a variety of topics.
 - Library services
 - PubMed
 - ClinicalTrials.gov
- Dozens of these questions are *consumer health questions*
 - Non-experts asking for medical information
 - Disclaimer: NLM cannot diagnose or replace advice of physician. NLM can connect consumers with information on NLM services.

Professionals vs. Consumers

Professional



Question

QA

Answer

Consumer



Question

QA

Answer

grammaticality

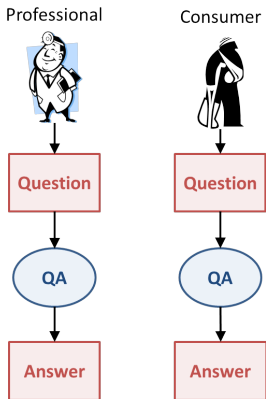
length

granularity

research vs. summary

PubMed vs. MedlinePlus

Professionals vs. Consumers



grammaticality
length
granularity

research vs. summary
PubMed vs. MedlinePlus

Professionals vs. Consumers

Professional



Question

QA

Answer

Consumer



Question

QA

Answer

grammaticality
length
granularity

research vs. summary
PubMed vs. MedlinePlus

Professionals vs. Consumers

Professional



Question

QA

Answer

Consumer



Question

QA

Answer

grammaticality
length
granularity

research vs. summary
PubMed vs. MedlinePlus

Examples

Consumer health question from NLM customer service:

My wife has been having shortness of breath in the mornings (mornings only). She has, what I think, excessive heart rate as well. Again, mornings only. Could this be anxiety attacks? I don't think it would be a heart issue. She certainly isn't overweight. SHe is 5'2"; and 100-105 pounds. if she is having anxiety attack... what is the best course of action? She seems to feel better when she lies down and rests.....while either watching TV...or sleeps. WHat is weird about it is ... it only happens in the mornings. SHe has no history in her family for heart disease either. WHat are your thoughts?

Consumer health question from GARD:

Do children with Cat Eye Syndrome generally experience a decline in physical abilities as they reach adulthood? Is there any shortening of the lifespan associated with this condition?

Goals

- **Goal 1:** Direct consumers to appropriate online encyclopedia entries (e.g., MedlinePlus, Genetic Home Reference)
 - Need to recognize central focus or topic of the question (e.g., disease, drug, procedure)
- **Goal 2:** Direct consumers to appropriate sections of online encyclopedia articles
 - Need to recognize the aspect of the focus/topic the consumer is interested in (e.g., treatment, diagnosis, symptoms)

Goals

- **Goal 1:** Direct consumers to appropriate online encyclopedia entries (e.g., MedlinePlus, Genetic Home Reference)
 - Need to recognize central focus or topic of the question (e.g., disease, drug, procedure)
- **Goal 2:** Direct consumers to appropriate sections of online encyclopedia articles
 - Need to recognize the aspect of the focus/topic the consumer is interested in (e.g., treatment, diagnosis, symptoms)

Data

GARD Corpus:

- Genetic and Rare Diseases Information Center (GARD)
- Disease-focused
- From the GARD website, with answers from experts
- 1,467 total requests

Data

GARD Corpus:

- Genetic and Rare Diseases Information Center (GARD)
- Disease-focused
- From the GARD website, with answers from experts
- 1,467 total requests

Data

GARD Corpus:

- Genetic and Rare Diseases Information Center (GARD)
- Disease-focused
- From the GARD website, with answers from experts
- 1,467 total requests

Data

GARD Corpus:

- Genetic and Rare Diseases Information Center (GARD)
- Disease-focused
- From the GARD website, with answers from experts
- 1,467 total requests

Process

3 steps:

I have been recently diagnosed with antisyntetase syndrome. Could you provide me with information on antisyntetase syndrome? I am also interested in learning about prognosis, treatment, and causes.

Process

3 steps:

(1) Identify focal disease

I have been recently diagnosed with **antisyntetase syndrome**. Could you provide me with information on antisyntetase syndrome? I am also interested in learning about prognosis, treatment, and causes.

Process

3 steps:

- (1) Identify focal disease
- (2) Decompose questions

I have been recently diagnosed with **antisyntetase syndrome**. Could you provide me with information on antisyntetase syndrome? I am also interested in learning about prognosis, treatment, and causes.

Could you provide me with information on antisyntetase syndrome?

I am also interested in learning about prognosis.

I am also interested in learning about treatment.

I am also interested in learning about causes.

Process

3 steps:

- (1) Identify focal disease
- (2) Decompose questions
- (3) Classify question types

I have been recently diagnosed with **antisyntetase syndrome**. Could you provide me with information on antisyntetase syndrome? I am also interested in learning about prognosis, treatment, and causes.

Could you provide me with information on antisyntetase syndrome? **INFORMATION**

I am also interested in learning about prognosis. **PROGNOSIS**

I am also interested in learning about treatment. **MANAGEMENT**

I am also interested in learning about causes. **CAUSE**

Anatomy

Questions about a particular part of the body, such as the location affected by a disease.

MedlinePlus: Anatomy/Physiology

- (1) *Does IP affect any areas inside the body, such as internal organs?*
- (2) *I was researching metachondromatosis - is this something that when felt is attached to the bone itself?*
- (3) *Can this cancer occur on someone's back?*

Cause

Questions about the cause of a disease.

MedlinePlus: Common Causes

- (1) *Can pregnancy trigger such an issue?*
- (2) *Can a father taking an antidepressant contribute to the reason a baby has a trisomy?*
- (3) *What increases the risk of males to have nondisjunction during meiosis?*

Complication

Questions about the risks faced by patients a particular disease causes.

MedlinePlus: Related Issues

- (1) *Are carriers of cystic fibrosis at a higher risk for other health conditions?*
- (2) *Can Charcot-Marie-Tooth disease cause a paralyzed laryngeal nerve?*
- (3) *I would like to ask about the serious complications associated with this disease.*

Diagnosis

Questions asking for help making a diagnosis, including diagnostic tests and methods for differential diagnosis.

MedlinePlus: Diagnosis, Testing

- (1) *Can Polycystic Kidney Diseases be diagnosed in pregnancy?*
- (2) *Is genetic testing available for Asperger syndrome?*
- (3) *How can I learn more about genetic testing for this syndrome?*

Information

Questions about general information about a disease.

MedlinePlus: Definition, Description

- (1) *Can you please provide me with general information about hyper IgD syndrome?*
- (2) *Is Machado Joseph disease a form of Parkinson's disease?*
- (3) *Is TMT a cancerous classification?*

Management

Questions about the management, treatment, cure, or prevention of a disease.

MedlinePlus: Treatment, Prevention

- (1) *Is there a diet guide that can help me plan a diet that is low in protein?*
- (2) *What treatments are available for this condition?*
- (3) *Is there a cure for HTLV-1 in general?*
- (4) *Is there anyway to prevent LHON with certain vitamins?*

Manifestation

Questions about signs or symptoms of a disease.

MedlinePlus: Symptoms

- (1) *What symptoms may people experience as their disease progresses?*
- (2) *Is fatigue a common symptom of polyglucosan body disease?*
- (3) *In autosomal dominant polycystic kidney disease (ADPKD), does the severity of symptoms tend to be the same among affected family members?*

OtherEffect

Questions about the effects of a disease, excluding MANIFESTATIONS or COMPLICATIONS.

MedlinePlus: Symptoms, Related Issues

- (1) *Does Klinefelter syndrome cause excess weight gain?*
- (2) *I was wondering if people with Pfeiffer syndrome have circulatory problems in their legs.*
- (3) *Is hearing loss in people with Waardenburg syndrome type II likely to be progressive?*

PersonOrg

Questions asking for a person or organization involved with a disease.

MedlinePlus: Organizations, Support Groups

- (1) *How can I find a physician who is knowledgeable about this condition?*
- (2) *Are there any new research studies enrolling people with carbamoyl phosphate synthase 1 deficiency?*
- (3) *How can I find other families that are in a similar situation?*

Prognosis

Questions about life expectancy, quality of life, or the probability of success of a given treatment.

MedlinePlus: Expectations

- (1) *What is the prognosis?*
- (2) *I would like to know what the life expectancy is for people with this syndrome.*
- (3) *What are her chances of survival if it is a cancerous tumor?*
- (4) *Am I going to have this for the rest of my life?*

Susceptibility

Questions asking how a disease is spread or distributed in a population.

MedlinePlus: Mode of Inheritance, Prevalence

- (1) *Is idiopathic thrombocytopenic purpura hereditary?*
- (2) *Will our baby inherit this condition from him?*
- (3) *How rare is this disorder?*
- (4) *Are people of certain religious backgrounds more likely to develop this syndrome?*

Other

Questions about diseases that do not belong to the above types.

MedlinePlus: Definition, Description

- (1) *How did Zellweger Syndrome get its name?*
- (2) *Does Medicaid cover genetic testing?*
- (3) *Could my family, which has French Canadian heritage, be related to the Canadian family described by Renpenning in the 1960s?*

NotDisease

Questions that aren't about a disease.

- (1) *Are there factors that may contribute to a falsely positive result?*
- (2) *However, being a dextrocardia patient, I wonder if a pacemaker can be put in my heart.*
- (3) *Is there any information about what those genes do?*

Research (Attribute)

Questions asking for the latest research, such as medical publications (PUBMED) or clinical trials (CLINICALTRIALS.GOV).

- (1) [CAUSE] *Has any research been done to check whether there is any viral involvement?*
- (2) [INFORMATION] *Are there any clinical studies currently being performed?*
- (3) [MANAGEMENT] *I would like to know whether current research is finding ways to cure this disease.*
- (4) [PROGNOSIS] *Where can I find studies which discuss these risks?*

Annotation Process

- 1,467 Requests \Rightarrow 2,937 Questions
 - Roberts et al., LREC 2014
- 5 annotators, double-annotation, resolution-by-committee
- 3 rounds of annotation ($\kappa = 0.80, 0.74, 0.79$, respectively)
- Slight tweaks to question types at each iteration

Annotation Results

Question Type	# Questions	# Requests	Accuracy	Kappa
ANATOMY	12	7	99.6	0.314
CAUSE	128	106	98.2	0.784
COMPLICATION	38	34	97.4	0.506
DIAGNOSIS	240	181	97.8	0.843
INFORMATION	531	445	94.3	0.819
MANAGEMENT	683	497	98.4	0.925
MANIFESTATION	104	85	96.5	0.714
OTHEREFFECT	277	199	96.0	0.570
PERSONORG	126	107	98.4	0.809
PROGNOSIS	311	244	96.2	0.795
SUSCEPTIBILITY	422	324	95.5	0.804
OTHER	52	40	96.2	0.327
NOTDISEASE	13	9	99.6	0.233
Total	2,937	—	81.0	0.787

Conclusions & Future Work

- 2,937 consumer health questions
- Annotated 13 question types
- Annotations are publicly available at:
<http://lhncbc.nlm.nih.gov/project/consumer-health-question-answering>
- Future work: automatic classification

Thanks!
Questions?

[Annotating Question Types for Consumer Health Questions](#)

Kirk Roberts, Kate Masterton, Marcelo Fiszman, Halil Kılıçoğlu, and Dina Demner-Fushman

U.S. National Library of Medicine