Appendix

This appendix includes more details on study sample exclusion criteria, additional methods, the standardized patient vignettes that were used, diagnosis and triage accuracy for each symptom checker, and the results of our sensitivity analyses.

Supplemental Table 1 categorizes the symptom checkers that were excluded from our study. After identifying symptom checkers through the inclusion criteria described in the Methods, the symptom checkers in this table were excluded on the basis of having the same underlying algorithm as another tool in our sample or for other characteristics that we decided detracted from the ability of the symptom checker to provide diagnostic and triage advice.

Our standardized patient vignettes were gathered from several sources, which are listed in Supplemental Table 2. Each vignette provided the age, gender, symptoms, and correct diagnosis for a given condition. This table also notes where we added additional symptoms if the symptom checkers asked for them. Added symptoms are italicized. The "simplified" symptoms were those inputted into each symptom checker.

To get a sense of the utilization of symptom checkers, we used Compete Pro to estimate the number of unique visitors to symptom checker websites during the month of October 2014 in Supplemental Table 3. The limitations of this market analysis website, including its inability to track some websites outside of the United States, those that were embedded within another website, and those with relatively low traffic, allowed us to only estimate total use for seven symptom checkers.

Supplemental Table 4 has additional information for Table 4 in the manuscript. This includes the accuracy of the diagnosis decision and triage advice for each symptom checker with the addition of the stratification by the severity of the SP vignette.

Lastly, we performed sensitivity analyses shown in Supplemental Table 5 to assess the appropriateness of the triage advice of the symptom checkers by excluding certain symptom checkers that were not as variable in their triage advice. This includes iTriage, which always suggested that the user visit an emergency department, and Symcat, Symptomate, and Isabel, all of which never suggest self-care. Excluding these symptom checkers only had a modest impact on rates of appropriate triage advice.

Additional Methods

We stratified the performance of the symptom checkers by whether the diagnosis given by the standardized patient vignette was “common” or “uncommon.” We defined “common” diagnoses as those that accounted for >0.3% of ambulatory visits (or >3,764,082 visits) in the United States in 2009-2010. These totals were compiled from data gathered by the Center for Disease Control (CDC), the National Ambulatory Medical Care Survey (NAMCS), and the National Hospital Ambulatory Medical Care Survey (NHAMCS).[1]

1. CDC, NAMCS, NHAMCS. Annual Number and Percent Distribution of Ambulatory Care Visits By Setting Type According to Diagnosis Group: United States, 2009-2010, 2010.

Supplemental Table 1: Symptom checkers excluded from study sample and reason for exclusion

Same Underlying Algorithm

Healthy Children (34)	**Steps2Care (28)**	**iTriage (14)**
Advocate Children's Hospital	AHN Health Finder	Bayshore Community Hospital
Allied Pediatrics of New York	Bon Secours	Bryan Health
Children's Medical Associates of Northern Virginia	Children's Clinic of Raceland	Crawford County Memorial Hospital
Children's On Call	College of Charleston	HCA Far West
ChildrensMD	Columbia St. Mary's	Inspira Health Network
ChildrensPGH	East Tennessee Children's Hospital	Jersey Shore Medical Center
CIMG	El Camino Hospital	Meridian Health
COPA	Eskenazi Health	Mountainview Hospital
Docs2Go	Indiana Univserity Health	Ocean Medical Center
Greenwood Peditrics	Intermountain health care	OnPoint Urgent Care
HPN/SHL	Lehigh Valley Health Network	Riverside Community Hospital
Kid Aches	Lourdes Hospital	Riverview Medical Center
Kid Care St. Louis Children's	Mobile Middlesex	Southern Ocean Medical Center
KidsDoc	Mobile Nurse	Sunrise Hospital and Medical Center
Lake Ray Hubbard Pediatrics	Novant Health	
MD 4Kids	Pediatric Associate of Greater Salem	**NHS Symptom Checkers (6)**
OU Medicine	Providence Health and Services	Health Direct Australia
PocketDoc	Robert Wood Johnson University Hospital	Martin Moth
REIS Pediatrics	SCL Health	NetDoctor
Sutter Health Mobile App	Seton health care family	NetDoctor
Swedish Kids	South Texas Regional Medical Center	North West Surrey
SymptomMD	Spectrum Health	Your.MD
UH Rainbow Babies and Children's Hospital	St. John Providence	
Vanderbilt University Medical Center	St. Vincent Health	**Healthwise (9)**
Virtual Nurse	UCLA Health	Blue Shield of California

Wasatch Pediatrics
Wesley Kids
Wesley Kids

FreeMD (1)

EverydayHealth

Drugs.com (4)

Best Android Symptom Checker
GenieMD
King Abdullah bin Abdulaziz Arabic Health Encyclopedia

Union County Hospital
UW Medicine
West Bloomfield Pediatrics

WebMD (2)

MedicineNet
RxList

Isabel (2)

Patient.co.uk
SmartHealth

Group Health mobile
Kaiser Permanente
Medical Mutual
Mercy
Network of Care
Sutter Health website
The Hospital of Central Connecticut
University of Michigan Health System

Healthline (2)

AARP
MSN Health and Fitness

Other Reasons for Exclusion

Tailored to specific condition (25)

ADA Dental Symptom Checker
Capital Otolaryngology
Child Mind Institute
ColicCalm
Coping Cat Parents
Ebola Symptom Test
First Aid and Symptom Checker
Flu Alert
Flu Facts
Fortis Malar Hospital
Hormone Balance Test
MBH Symptom Checker
MedZam Cold Flu
MedZam Migraines
MedZam Restless Leg and Limb

Symptom tracker (3)

Healee
RheumaTrack
Symple

For pets (7)

Dog and Cat Dentist
PawNation
Pet Education
PetCareRx
PetMD
WebDVM
ZooToo

Not working (2)

Dignity Health

Medical advice only (14)

A.D.A.M. Symptom Checker
About.com
Alabama Blue Health Handbook
Diagnosis And Therapy
First Aid American Red Cross
First Consult
How Stuff Works
Medical Symptoms
Medical Wiz
Parents.com
The Wellness Digest
Urgent Care
Xpress Urgent Care
Your Medial Encyclopedia

MedZam Strep Throat
Meningitis
Myofascial Therapy.org
Neocate
Pregnancy Test
Presbyterian/St. Luke's
Shingles Symptom Checker
SportsInjuryClinic
Trigger Point Products
USF Health
Saint Thomas Health

Talk to a doctor (4)

Amwell
Doctor on Demand
MD Live
RelyMD

Supplemental Table 2: The 45 standardized patient vignettes used to judge the symptom checkers' accuracy and their condensed formats

Diagnosis	Vignette	Simplified (*added symptoms)*
Requires emergent care (n=15)		
Acute liver failure[1]	A 48-year-old woman with a history of migraine headaches presents to the emergency room with altered mental status over the last several hours. She was found by her husband, earlier in the day, to be acutely disoriented and increasingly somnolent. On physical examination, she has scleral icterus, mild right upper quadrant tenderness, and asterixis. Preliminary laboratory studies are notable for a serum ALT of 6498 units/L, total bilirubin of 5.6 mg/dL, and INR of 6.8. Her husband reports that she has consistently been taking pain medications and started taking additional 500 mg acetaminophen pills several days ago for lower back pain. Further history reveals a medication list with multiple acetaminophen-containing preparations.	48 y/o f, confusion, disorientation, increasingly drowsy, mild right upper quadrant tenderness, chronic tylenol/acetaminophen - recently took more
Appendicitis[1]	A 12-year-old girl presents with sudden-onset severe generalized abdominal pain associated with nausea, vomiting, and diarrhea. On exam she appears ill and has a temperature of 104°F (40°C). Her abdomen is tense with generalized tenderness and guarding. No bowel sounds are present.	12 y/o f, sudden onset severe abdominal pain, nausea, vomiting, diarrhea, T=104
Asthma[1]	A 27-year-old woman with a history of moderate persistent asthma presents to the emergency room with progressive worsening of shortness of breath, wheezing, and cough over 3 days. She reports prior exposure to a person who had a runny nose and a hacking cough. She did not receive significant relief from her rescue inhaler with worsening symptoms, despite increased use. She has been compliant with her maintenance asthma regimen, which consists of an inhaled corticosteroid and a leukotriene receptor antagonist for maintenance therapy and albuterol as rescue therapy. Her cough is disrupting her sleep pattern and as a consequence she is experiencing daytime somnolence, which is affecting her job performance.	27 y/o f, Hx of asthma, mild shortness of breath, wheezing, 3 days cough, symptoms not responsive to inhalers, recent cold
COPD flare (more seve	A 67-year-old woman with a history of COPD presents with 3 days of worsening dyspnea and increased frequency of coughing. Her cough is now productive of green, purulent sputum. The patient has a 100-pack-year history of smoking. She has had intermittent, low-grade fever of 100°F (37.7°C) for the past 3 days and her appetite is poor. She has required increased use of rescue bronchodilator therapy in addition to her maintenance medications to control symptoms.	67 y/o f, Hx of COPD, 3 days worsening shortness of breath, increase coughing, green sputum, low grade fever, increase use of rescue bronchodilator therapy
Deep vein thrombosis[1]	A 65-year-old woman presents with unilateral leg pain and swelling of 5 days' duration. There is a history of hypertension, mild CHF, and recent hospitalization for pneumonia. She had been recuperating at home but on beginning to mobilize and walk, the right leg became painful, tender, and swollen. On examination, the right calf is 4 cm greater in circumference than the left when measured 10 cm below the tibial tuberosity. Superficial veins in the leg are more dilated on the right foot and the right leg is slightly redder than the left. There is some tenderness on palpation in the popliteal fossa behind the knee.	65 y/o f, 5 days swelling, pain in one leg, recent hospitalization, leg painful, tender, swollen, red

Heart Attack [2]	Mr. Y is a 64 year old Chinese male who presents with chest pain for 24 hours. One day prior to presentation, the patient began to experience 8/10, non-radiating substernal chest pressure associated with diaphoresis and shortness of breath. The pain intially improved with Tylenol, however over the following 24 hours, his symptoms worsened. The patient went to his primary physician, where an EKG was performed which showed ST elevation in leads V2-V6.	64 y/o m, 1 day chest pain (8/10), non-radiating substernal chest pressure, sweating, shortness of breath, (*chest tightness*)
Hemolytic uremic syndrome[1]	A 4-year-old boy presents with a 7-day history of abdominal pain and watery diarrhea that became bloody after the first day. Three days before the onset of symptoms, he had visited the county fair with his family and had eaten a hamburger. Physical examination reveals a mild anemia	4 y/o m, 7 day Hx of abdominal pain, bloody diarrhea, ate hamburger at fair 3 days ago
Kidney stones[1]	A 45-year-old white man presents to the emergency department with a 1-hour history of sudden onset of left-sided flank pain radiating down toward his groin. The patient is writhing in pain, which is unrelieved by position. He also complains of nausea and vomiting.	45 y/o m, 1 hour severe left-sided flank pain radiating into groin, nausea, vomiting, pain unrelieved by position
Malaria[1]	A 28-year-old man presents to his physician with a 5-day history of fever, chills, and rigors, not improving with acetaminophen (paracetamol), along with diarrhea. He had been traveling in Central America for 3 months, returning 8 weeks ago. He had been bitten by mosquitoes on multiple occasions, and although he initially took malaria prophylaxis, he discontinued it due to mild nausea. He does not know the specifics of his prophylactic therapy. On examination he has a temperature of 100.4°F (38°C), and is mildly tachycardic with a BP of 126/82 mmHg. The remainder of the examination is normal.	28 y/o m, 5 day Hx of fever, chills, rigors, diarrhea, recent travel abroad to area with malaria, bitten by mosquitoes, did not take malaria prophylaxis consistently
Meningitis[1]	An 18-year-old male student presents with severe headache and fever that he has had for 3 days. Examination reveals fever, photophobia, and neck stiffness.	18 y/o m, 3 days severe headache, fever, photophobia, neck stiffness
Pneumonia [3]	A 65-year-old man with hypertension and degenerative joint disease presents to the emergency department with a three-day history of a productive cough and fever. He has a temperature of 38.3°C (101°F), a blood pressure of 144/92 mm Hg, a respiratory rate of 22 breaths per minute, a heart rate of 90 beats per minute, and oxygen saturation of 92 percent while breathing room air. Physical examination reveals only crackles and egophony in the right lower lung field. The white-cell count is 14,000 per cubic millimeter, and the results of routine chemical tests are normal. A chest radiograph shows an infiltrate in the right lower lobe.	65 y/o m, Hx of hypertension and degenerative joint disease, 3 day Hx of productive cough and fever (101)

Pulmonary embolism[1]	A 65-year-old man presents to the emergency department with acute onset of SOB of 30 minutes' duration. Initially, he felt faint but did not lose consciousness. He is complaining of left-sided chest pain that worsens on deep inspiration. He has no history of cardiopulmonary disease. A week ago he underwent a total left hip replacement and, following discharge, was on bed rest for 3 days due to poorly controlled pain. He subsequently noticed swelling in his left calf, which is tender on examination. His current vital signs reveal a fever of 100.4°F (38.0°C), heart rate 112 bpm, BP 95/65, and an O2 saturation on room air of 91%.	65 y/o m, shortness of breath for 30 min, chest pain that worsens with inspiration, recent surgery, recent bed rest, swelling in left calf, which is tender, fever
Rocky Mountain Spotted Fever[4]	An 8-year-old boy in Oklahoma is brought to the emergency department over the fourth of July weekend because of fever, chills, malaise, athralgias, and a headache. Physical examination reveals a maculopapular rash that is most prominent on his wrists and ankles.	8 y/o m, Fever, chills, joint pain, headache, rash wrists/ankles
Stroke[1]	A 70-year-old man with a history of chronic HTN and atrial fibrillation is witnessed by a family member to have nausea, vomiting, and right-sided weakness, as well as difficulty speaking and comprehending language. The symptoms started with only mild slurred speech before progressing over several minutes to severe aphasia and right arm paralysis. The patient is taking warfarin.	70 y/o m, nausea, vomiting, right-sided weakness, rt arm paralysis, difficulty speaking and comprehension
Tetanus[1]	A 63-year-old man sustained a cut on his hand while gardening. His immunization history is significant for not having received a complete tetanus immunization schedule. He presents with signs of generalized tetanus with trismus ("lock jaw"), which results in a grimace described as "risus sardonicus" (sardonic smile). Intermittent tonic contraction of his skeletal muscles causes intensely painful spasms, which last for minutes, during which he retains consciousness. The spasms are triggered by external (noise, light, drafts, physical contact) or internal stimuli, and as a result he is at the risk of sustaining fractures or developing rhabdomyolysis. The tetanic spasms also produce opisthotonus, board-like abdominal wall rigidity, dysphagia, and apneic periods due to contraction of the thoracic muscles and/or glottal or pharyngeal muscles. During a generalized spasm the patient arches his back, extends his legs, flexes his arms in abduction, and clenches his fists. Apnea results during some of the spasms. Autonomic overactivity initially manifests as irritability, restlessness, sweating, and tachycardia. Several days later this may present as hyperpyrexia, cardiac arrhythmias, labile hypertension, or hypotension.	65 y/o m, cannot open mouth, contraction of muscles causing painful spasms for minutes, sweating, tachycardia, cut hand while gardening, did not get tetanus shot
Requires non-emergent care (n=15)		
Acute otitis media[1]	An 18-month-old toddler presents with 1 week of rhinorrhea, cough, and congestion. Her parents report she is irritable, sleeping restlessly, and not eating well. Overnight she developed a fever. She attends day care and both parents smoke. On examination signs are found consistent with a viral respiratory infection including rhinorrhea and congestion. The toddler appears irritable and apprehensive and has a fever. Otoscopy reveals a bulging, erythematous tympanic membrane and absent landmarks.	18 mo f, 1 week rhinorrhea, cough, congestion, irritable, lack of appetite, fever, in daycare

Acute pharyngitis[1]	A 7-year-old girl presents with abrupt onset of fever, nausea, vomiting, and sore throat. The child denies cough, rhinorrhea, or nasal congestion. On physical exam, oral temperature is 101°F (38.5°C) and there is an exudative pharyngitis, with enlarged cervical lymph nodes. A rapid antigen test is positive for group A *Streptococcus* (GAS).	7 y/o f, fever (101), nausea, vomiting, sore throat, swollen lymph nodes, tonsilar exudate; no cough, rhinorrhea, or nasal congestion
Acute pharyngitis[5]	Mr. A is a 24 year-old man who presents to your office for complaints of sore throat, fever, and headache. His symptoms started 2 days ago with acute onset of sore throat and fever to 102.2. He has had no cough. His physical examination is normal, except for the presence of tonsillar exudates and some tender anterior cervical lymphadenopathy. He is otherwise in good health, and is on no medications except for ibuprofen for fever. He has no drug allergies. (, Centor score = 4 – treat, or test and treat)	24 y/o m, sore throat, fever (102.2), headache, no cough,tonsilar exudates
Acute sinusitis[5]	Mrs. S is a 35 year-old woman who presents with 15 days of nasal congestion. She has had facial pain and green nasal discharge for the last 12 days. She has had no fever. On physical examination, she has no fever and the only abnormal finding is maxillary tenderness on palpation. She is otherwise healthy, except for mild obesity. She is on no medications, except for an over-the-counter decongestant. She has no drug allergies	35 y/o f, sx for 15 days, nasal congestion, facial pain, green nasal discharge, no fever
Back pain[6]	Consider a 35-year-old man who developed low back pain after shoveling snow 3 weeks ago. He presents to the office for an evaluation. On examination there is a new left foot drop. In study 82% physicians recommend MRI (sciatica/sprain)	35 y/o m, back pain following shoveling, left foot drop, symptoms 3 weeks of duration (*loss of sensation in foot)*
Cellulitis[1]	A 45-year-old man presents with acute onset of pain and redness of the skin of his lower extremity. Low-grade fever is present and the pretibial area is erythematous, edematous, and tender.	45 y/o m, pain and redness of skin, low grade fever, redness, edema, and tenderness lower leg
COPD flare (milder)[1]	A 56-year-old woman with a history of smoking presents to her primary care physician with shortness of breath and cough for several days. Her symptoms began 3 days ago with rhinorrhea. She reports a chronic morning cough productive of white sputum, which has increased over the past 2 days. She has had similar episodes each winter for the past 4 years. She has smoked 1 to 2 packs of cigarettes per day for 40 years and continues to smoke. She denies hemoptysis, chills, or weight loss and has not received any relief from over-the-counter cough preparations.	56 y/o f, Hx of smoking, shortness of breath and cough for several days, rhinorrhea 3 days ago, white sputum, no chills
Influenza[1]	A 30-year-old woman presents in January with 2-day history of fever, cough, headache, and generalized weakness. She was in her usual state of health before an abrupt onset of these symptoms. A few viral illnesses have affected her during the current winter, but not to this severity. She reports sick contacts at work and did not receive the seasonal influenza vaccine this season.	30 y/o f, 2 day fever, cough, headache, weakness, did not get flu shot

Mononucleosis[1]	A 16-year-old female high school student presents with complaints of fever, sore throat, and fatigue. She started feeling sick 1 week ago. Her symptoms are gradually getting worse, and she has difficulty swallowing. She has had a fever every day, and she could hardly get out of bed this morning. She does not remember being exposed to anybody with a similar illness recently. On physical examination she is febrile and looks sick. Enlarged cervical lymph nodes, exudative pharyngitis with soft palate petechiae and faint erythematous macular rash on the trunk and arms are found.	16 y/o f, 1 week Hx of fever, sore throat, fatigue, difficulty swallowing, fever, enlarged lymph nodes, exudates, macular rash on trunk/arms
Peptic Ulcer Disease[1]	A 40-year-old man presents to his primary care physician with a 2-month history of intermittent upper abdominal pain. He describes the pain as a dull, gnawing ache. The pain sometimes wakes him at night, is relieved by food and drinking milk, and is helped partially by ranitidine. He had a similar but milder episode about 5 years ago, which was treated with omeprazole. Physical examination reveals a fit, apparently healthy man in no distress. The only abnormal finding is mild epigastric tenderness on palpation of the abdomen.	40 y/o m, 2 month Hx of intermittent upper abdominal pain, dulling and gnawing ache, wakes at night and is relieved by food/drinking milk/ranitidine, prior episode 5 yrs ago
Pneumonia[1]	A 6-year-old boy with a medical history significant for mild persistent asthma is brought to the clinic by his mother with a history of a 5-day cough. His mother reports that the child's fever continues to be elevated despite acetaminophen therapy. He has missed school for the past 3 days and he has a classmate sick with pneumonia. The mother reports that the appetite is good for the child. His cough produced yellowish sputum at home. His vitals at the clinic are: respiratory rate 19 breaths/min, heart rate 80 beats/min, and temperature 101.6°F (38.7°C). He appears in no respiratory distress. His lung examination reveals bilateral rales and occasional wheeze. CXR reveals lobar infiltrates without pleural effusions.	6 y/o m, Hx of asthma, 5 days cough, fever, appetite good, yellow sputum, t 101.6
Salmonella[1]	A 14-year-old boy presents with nausea, vomiting, and diarrhea. Eighteen hours earlier, he had been at a picnic where he ingested undercooked chicken along with a variety of other foods. He reports moderate-volume, nonbloody stools occurring 6 times a day. He has mild abdominal cramps and a low-grade fever. He is evaluated at an acute care clinic and found to be mildly tachycardic (heart rate 105 bpm) with a normal BP and a low-grade temperature of 100.1°F (37.8°C). His physical exam is unremarkable except for mild diffuse abdominal tenderness and mild increased bowel sounds. He is able to take oral fluids and is instructed on the appropriate oral fluid and electrolyte rehydration.	14 y/o m, nausea, vomiting, non-bloody diarrhea, mild abdominal cramps (T=100.1), mild abdominal tenderness, diarrhea after attending a picnic and eating undercooked chicken,
Shingles[1]	A 77-year-old man reports a 5-day history of burning and aching pain on the right side of his chest. This is followed by the development of erythema and a maculopapular rash in this painful area, accompanied by headache and malaise. The rash progressed to develop clusters of clear vesicles for 3 to 5 days, evolving through stages of pustulation, ulceration, and crusting.	77 y/o m, 5 day burning and aching on right side of chest, erythema, maculopapular rash, headache, malaise, rash progressed to clear vesicles after 3-5 days

Urinary tract infection[1]	A 26-year-old female newly wed presents complaining of painful urination, feeling of urgent need to urinate, and more frequent urination for 2 days. She denies any fever, chills, nausea, vomiting, back pain, vaginal discharge, or vaginal pruritus.	26 y/o f, painful urination, urgent need to urinate, more frequent urination for 2 days, sexually active; no fever, chills, nausea, vomiting, back pain, vaginal discharge, vaginal pruritus
Vertigo[1]	A 65-year-old woman presents with a chief complaint of dizziness. She describes it as a sudden and severe spinning sensation precipitated by rolling over in bed onto her right side. Symptoms typically last <30 seconds. They have occurred nightly over the last month and occasionally during the day when she tilts her head back to look upward. She describes no precipitating event prior to onset and no associated hearing loss, tinnitus, or other neurologic symptoms. Otologic and neurologic examinations are normal except for the Dix-Hallpike maneuver, which is negative on the left but strongly positive on the right side.	65 y/o f, dizziness, sudden onset, recurrent, lasts <30 sec, consistent trigger, no hearing loss, ringing in ears, muscle weakness, loss of sensation
Self-care appropriate (n=15)		
Acute bronchitis[1]	A 34-year-old woman with no known underlying lung disease 12-day history of cough. She initially had nasal congestion and a mild sore throat, but now her symptoms are all related to a productive cough without paroxysms. She denies any sick contacts. On physical examination she is not in respiratory distress and is afebrile with normal vital signs. No signs of URI are noted. Scattered wheezes are present diffusely on lung auscultation.	34 y/o f, 12 day cough, initial nasal congestion and sore throat, cough, no fever
Acute bronchitis[5]	Mrs. L is a 61 year-old woman who presents with 4 days of a cough productive of yellow sputum. Her symptoms started 4 days ago with rhinorrhea and productive cough. She initially had fevers as high as 101 for 2 days, but those have now resolved. In the office, she has normal vital signs and a normal physical examination. She is otherwise healthy except for high cholesterol for which she is being treated with atorvastatin. She has no drug allergies.	61 y/o f, 4 day cough, yellow sputum, rhinorrhea, fever (resolved)
Acute conjunctivitis[1]	A 14-year-old boy with no significant past medical history presents 3 days after developing a red, irritated right eye that spread to the left eye today. He has watery discharge from both eyes and they are stuck shut in the morning. He reports recent upper respiratory symptoms and that several children at his day camp recently had pink eye. He denies significant pain or light sensitivity and does not wear contact lenses. On examination, his pupils are equal and reactive and he has a right-sided, tender preauricular lymph node. Penlight examination does not reveal any corneal opacity.	14 y/o m, 3 days red, irritated eye (spread from right to left), discharge, URI symptoms, no pain or light sensitivity
Acute pharyngitis[5]	Mr. E is a 26 year-old man who presents to your office for complaints of sore throat, headache, and non-productive cough. His symptoms started 2 days ago with acute onset of sore throat. He has been afebrile. His physical examination is normal, except for some pharyngeal erythema. He is otherwise in good health, and is on no medications except for acetaminophen for his sore throat and fever. He has no drug allergies.	26 y/o m, 2 day sore throat, headache, cough, no fever

Allergic rhinitis[1]	A 22-year-old student presents with a 5-year history of worsening nasal congestion, sneezing, and nasal itching. Symptoms are year-round but worse during the spring season. On further questioning it is revealed that he has significant eye itching, redness, and tearing as well as palate and throat itching during the spring season. He remembers that his mother told him at some point that he used to have eczema in infancy.	22 y/o m, 5 year Hx of nasal congestion, sneezing, nasal itching worse during spring season, eye itching, redness, tearing, palate and throat itching, Hx of eczema in infancy
Back pain[1]	A 38-year-old man with no significant history of back pain developed acute LBP when lifting boxes 2 weeks ago. The pain is aching in nature, located in the left lumbar area, and associated with spasms. He describes previous similar episodes several years ago, which resolved without seeing a doctor. He denies any leg pain or weakness. He also denies fevers, chills, weight loss, and recent infections. Over-the-counter ibuprofen has helped somewhat, but he has taken it only twice a day for the past 3 days because he does not want to become dependent on painkillers. On examination, there is decreased lumbar flexion and extension secondary to pain, but a neurologic exam is unremarkable.	38 y/o m, acute low back pain after lifting, no leg pain or weakness, no fevers, chills, weight loss, or recent infections
Bee sting without anaphylaxis[1]	A 9-year-old boy is brought to the ER after being stung by a bee at a picnic. He is crying hysterically. After 15 minutes of calming him down, exam reveals a swollen tender upper lip but no tongue swelling, no drooling, no stridor, no rash, and no other complaints.	9 y/o m, bee sting, swollen and tender upper lip; no tongue swelling, drooling, stridor, rash, or other complaints
Canker sore[1]	A 17-year-old male student presents with recurrent mouth ulceration since his early schooldays. He has no respiratory, anogenital, gastrointestinal, eye, or skin lesions. His mother had a similar history as a teenager. The social history includes no tobacco use and virtually no alcohol consumption. He has no history of recent drug or medication ingestion. Extraoral exam reveals no significant abnormalities and specifically no pyrexia; no cervical lymph node enlargement; nor cranial nerve, salivary, or temporomandibular joint abnormalities. Oral exam reveals a well-restored dentition and there is no clinical evidence of periodontal-attachment loss or pocketing. He has five 4 mm round ulcers with inflammatory haloes in his buccal mucosae.	17 y/o m with recurrent mouth ulceration for year, no respiratory, anogenital, gastrointestinal, eye, or skin lesions, mother has similar Hx, no Hx of recent drugs or medication
Candidal yeast infection[6]	Consider a 40-year-old, monogamous, married woman who calls to report a 2-day history of vaginal itching and thick white discharge. She has no abdominal pain or fever. (in study 50% recommended physician visit)	40 y/o f, 2 day vaginal itching, thick white discharge, no abdominal pain or fever

Constipation[1]	A 5-month-old baby boy presents with difficulty and delay in passing hard stools. His mother reports that he strains for several hours and may even miss a day, before passing stool with screaming and occasional spots of fresh blood on the stool or diaper. He has recently been weaned from breastfeeding to cows' milk formula, which he had been reluctant to drink initially. The child is thriving and now feeding normally. There was no neonatal delay in defecation and no history of excessive vomiting or abdominal distension.	5 mo m, difficulty/delay in passing hard stools, strains for hours, may miss a day, screams when passes stool and occasional spots of blood, weaned from breastmilk to cows' milk, now feeding normally
Eczema[1]	A 12-year-old female presents with dry, itchy skin that involves the flexures in front of her elbows, behind her knees, and in front of her ankles. Her cheeks also have patches of dry, scaly skin. She has symptoms of hay fever and has recently been diagnosed with egg and milk allergy. She has a brother with asthma and an uncle and several cousins who have been diagnosed with eczema.	12 y/o f, dry, itchy skin in front of elbows, behind knees, in front of ankles, cheeks have patches of dry, scaly skin, symptoms of hay fever, egg and milk allergy, brother has asthma and uncle and cousins have eczema
Stye[1]	A 30-year-old man presents with a painful, swollen right eye for the past day. He reports minor pain on palpation of the eyelid and denies any history of trauma, crusting, or change in vision. He has no history of allergies or any eye conditions and denies the use of any new soaps, lotions, or creams. On exam, he has localized tenderness to palpation and erythema on the midline of the lower eyelid near the lid margin. The remainder of the physical exam, including the globe, is normal.	30 y/o m, painful, swollen right eye for past day, no Hx of trauma, crusting, change in vision, allergies, or eye conditions, localized tenderness, erythema (redness)
Viral upper respiratory	Mr. R. is a 56 year-old man who presents to you with 6 days of non-productive cough, nasal congestion, and green nasal discharge. He has had intermittent fevers as high as 100.8. His physical examination is normal except for rhinorrhea. He is otherwise healthy, except for chronic osteoarthritis of the right knee. He has no drug allergies.	56 y/o m, 6 day cough, nasal congestion, green nasal discharge, fever (100.8), rhinorrhea

Viral upper respiratory	A 30-year-old man presents with a 2-day history of runny nose and sore throat. He feels hot and sweaty, has a mild headache, is coughing up clear sputum and complains of muscle aches. He would like antibiotics as he was prescribed them last year when he had a similar condition. On examination, he is afebrile, has a normal pulse, a slightly inflamed pharynx and nontender cervical lymphadenopathy. There is no neck stiffness and his chest is clear. He has tried over-the-counter cough medications, but has not found these helpful. He smokes 10 cigarettes per day.	30 y/o m, 2 day HX of runny nose, sore throat, hot, sweaty, mild headache, cough with clear sputum, muscle aches, no fever or neck stiffness
Vomiting[7]	Elizabeth's 2-year-old son has a fever and vomited twice. Elizabeth worries about dehydration, so she gives Jack a sippy cup of apple juice. He immediately vomits up the juice. Elizabeth debates what to do next. Should she try to reach Jack's pediatrician or should she take Jack to the ED? Instead, she calls her triage nurse line. Temperature = 100.5	2 y/o m, low grade fever (T = 100.5), vomited twice, vomits up juice

Table References

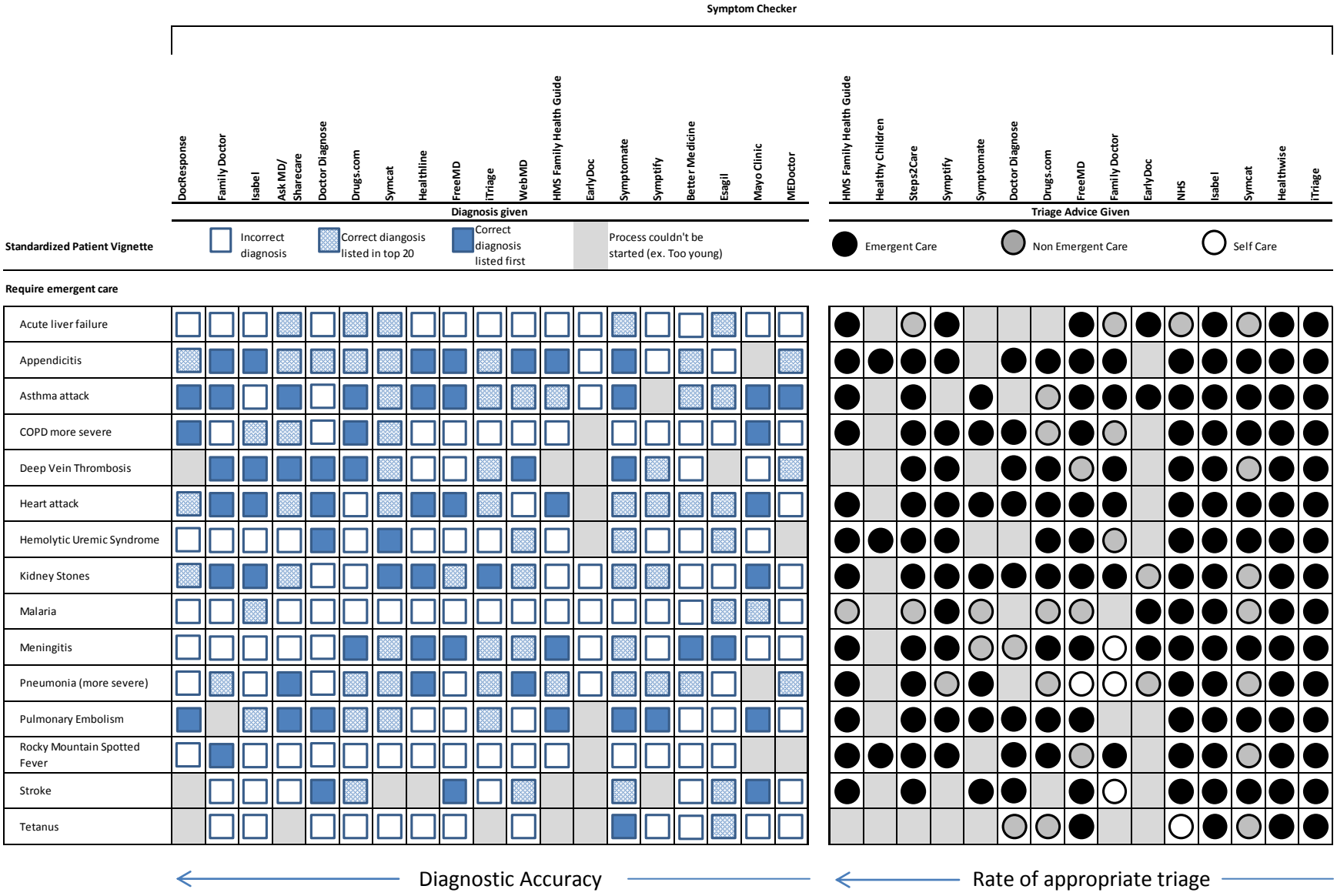
1. Epocrates. https://online.epocrates.com/noFrame/. 2014.
2. Lue J. NYU Medical Grand Rounds Clinical Vignette. 2012; http://www.medicine.med.nyu.edu/education/im-residency-homepage/research-opportunities/clinical-vignettes. Accessed September 8, 2014.
3. Halm EA, Teirstein AS. Clinical practice. Management of community-acquired pneumonia. N Engl J Med. Dec 19 2002;347(25):2039-2045.
4. Plantz SH, Adler JN, eds. NMS Emergency Medicine. Baltimore: Williams & Wilkins; 1998. National Medical Series for Independent Study.
5. Gidengil CA, Linder J, Beach S, Setodjian C, Hunter G, Mehrotra A. Using clinical vignettes to predict antibiotic prescribing for acute respiratory infections. In review.
6. Sirovich BE, Gottlieb DJ, Welch HG, Fisher ES. Variation in the tendency of primary care physicians to intervene. Arch Intern Med. Oct 24 2005;165(19):2252-2256.
7. Boroughs DS, Dougherty JA, Goldsmith C. Telephone Triage: Help Is Just a Call Away. http://ce.nurse.com/RVignette.aspx?TopicId=718. Accessed September 10, 2014.

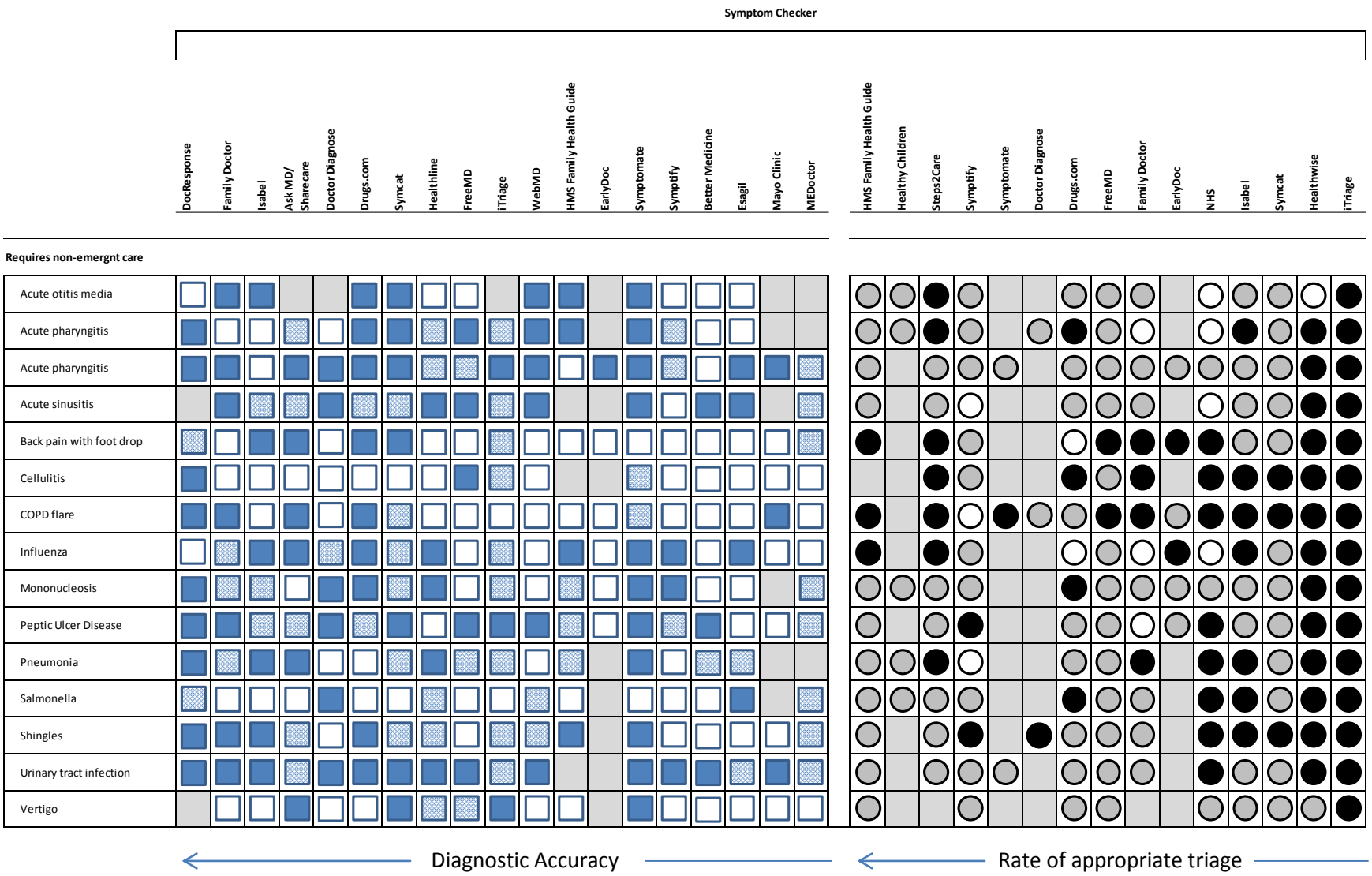
Supplemental Table 3: Estimation of unique visitors to symptom checker websites in October 2014 using Compete Pro[1]

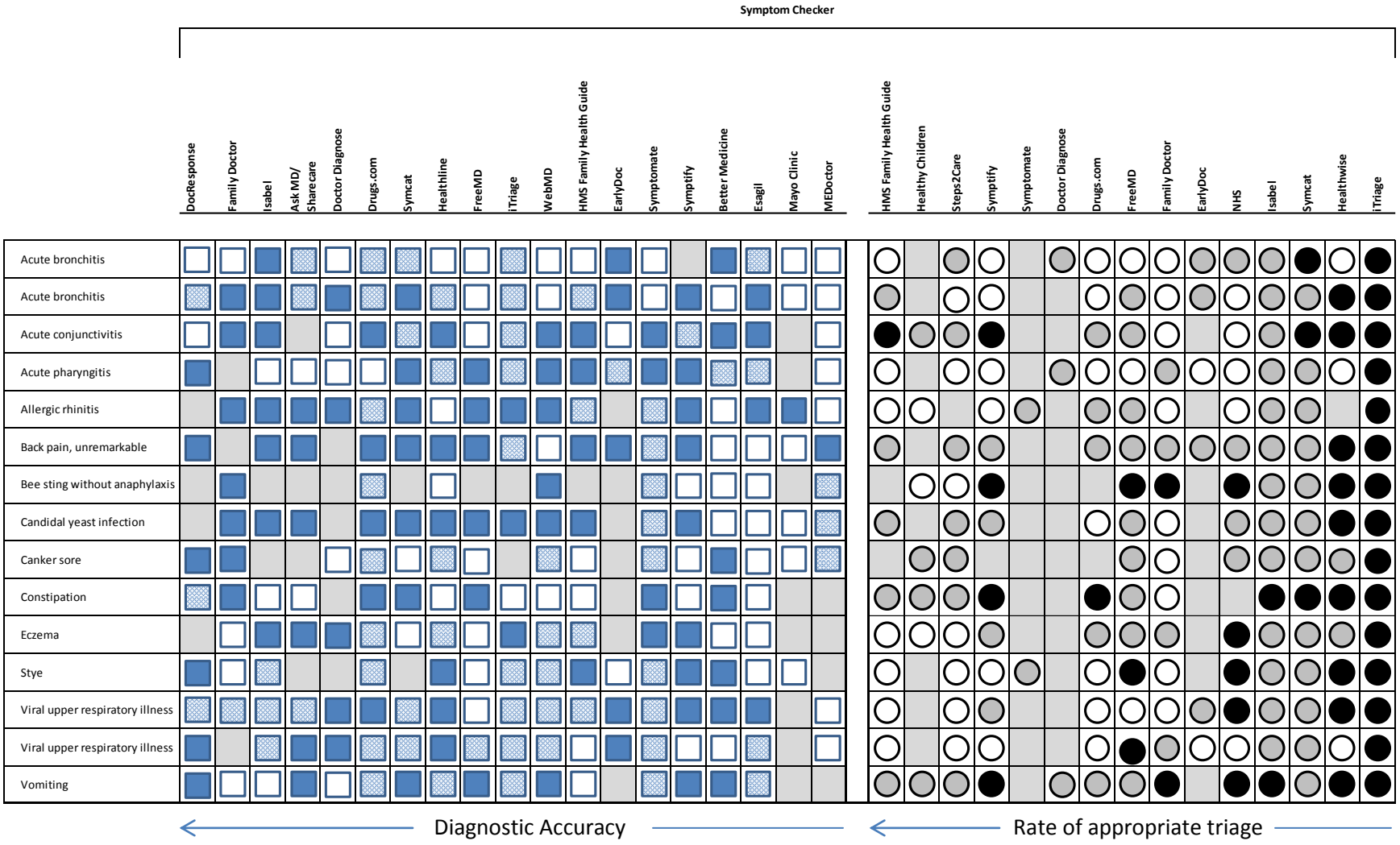
Symptom Checker	Number of Unique Visitors
AskMD/Sharecare	4,220
EarlyDoc	16,826
FreeMD	37,545
Isabel	10,517
iTriage	198,398
Symcat	2,889
WebMD	975,127
Total	1,246,071

[1] Compete. https://www.compete.com/. 2014.

Supplemental Table 4: Diagnosis and triage advice from each symptom checker, stratified by severity of the standardized patient vignette. The symptom checkers are organized by the accuracy of listing the correct diagnosis first and the rate of appropriate triage in descending order from left to right under each respective heading.




Symptom Checker
DocResponse
Family Doctor
Isabel
Ask MD/ Sharecare
Doctor Diagnose
Drugs.com
Symcat
Healthline
FreeMD
iTriage
WebMD
HMS Family Health Guide
EarlyDoc
Symptomate
Symptify
Better Medicine
Esagil
Mayo Clinic
MEDoctor
HMS Family Health Guide
Healthy Children
Steps2Care
Symptify
Symptomate
Doctor Diagnose
Drugs.com
FreeMD
Family Doctor
EarlyDoc
NHS
Isabel
Symcat
Healthwise
iTriage
Requires non-emergnt care
Acute otitis media
Acute pharyngitis
Acute pharyngitis
Acute sinusitis
Back pain with foot drop
Cellulitis
COPD flare
Influenza
Mononucleosis
Peptic Ulcer Disease
Pneumonia
Salmonella
Shingles
Urinary tract infection
Vertigo
Diagnostic Accuracy
Rate of appropriate triage


Symptom Checker
DocResponse
Family Doctor
Isabel
Ask MD/ Sharecare
Doctor Diagnose
Drugs.com
Symcat
Healthline
FreeMD
iTriage
WebMD
HMS Family Health Guide
EarlyDoc
Symptomate
Symptify
Better Medicine
Esagil
Mayo Clinic
MEDoctor
HMS Family Health Guide
Healthy Children
Steps2Care
Symptify
Symptomate
Doctor Diagnose
Drugs.com
FreeMD
Family Doctor
EarlyDoc
NHS
Isabel
Symcat
Healthwise
iTriage
Acute bronchitis
Acute bronchitis
Acute conjunctivitis
Acute pharyngitis
Allergic rhinitis
Back pain, unremarkable
Bee sting without anaphylaxis
Candidal yeast infection
Canker sore
Constipation
Eczema
Stye
Viral upper respiratory illness
Viral upper respiratory illness
Vomiting
Diagnostic Accuracy
Rate of appropriate triage

Supplemental Table 5: Sensitivity analysis for overall appropriateness of triage advice when symptom checkers that always provide advice to go to the emergency department are removed (iTriage) and when symptom checkers that never suggest self-care are removed (Symcat, Symptomate, and Isabel).

	Rate*	**Appropriate triage % (95% CI)**
All symptom checkers	301/532	57 (52 to 61)
Without iTriage	287/489	59 (54 to 63)
Without Symcat, Symptomate, and Isabel	249/428	58 (53 to 63)
Without Symcat, Symptomate, Isabel, and iTriage	235/385	61 (56 to 66)

* Number of correct SP evaluations divided by applicable SP evaluations. As noted in text, some SP vignettes could not be applied to a given symptom checker. For example, we could not evaluate an adult SP vignette if it was a pediatric symptom checker.