

# Time for a Time-out: The Value of a Diagnostic Time-out in Prolonged Fever and Lymphadenopathy

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## CASE PRESENTATION

A previously healthy 3-year-old girl was admitted to the inpatient general pediatrics floor with a 2-week history of fevers, unilateral cervical lymphadenopathy, and stomatitis. An ultrasound of the neck revealed a large fluid collection with surrounding enlarged lymph nodes. She had poor oral intake and subjective weight loss over the past 2 weeks. She had a thrombocytosis of 574 000/mL as well as microcytic anemia, which was thought likely to be iron deficiency anemia due to excessive milk intake. Her C-reactive protein and erythrocyte sedimentation rate were elevated at 19.4 mg/dL (norm <1.0 mg/dL) and 129 mm/hour (norm <20 mm/hour). She received intravenous antibiotics for a presumed neck abscess. Because of the constellation of fever duration, unilateral lymphadenopathy, and laboratory results, she was subsequently diagnosed with incomplete Kawasaki disease (KD) that was thought to be complicated by lymphadenitis. Notably, she did not have conjunctivitis, rash, swelling or desquamation of her peripheral extremities, or changes in the lips or oral cavity. She received intravenous immunoglobulin and aspirin therapy. An echocardiogram result was unremarkable for coronary artery abnormalities. Despite treatment, she had no improvement of her neck abscess and therefore underwent a fine-needle aspiration by the otolaryngology service, which revealed a negative culture result. She had negative Epstein-Barr and Bartonella titers. After completing 8 days of antibiotics, she was discharged from the hospital with aspirin and cardiology follow-up.

Two weeks later, she was readmitted for persistent left-sided neck swelling with worsening pain and new-onset ear drainage. A neck ultrasound was repeated and revealed a lateral neck abscess versus a necrotic lymph node, slightly increased in size. Computed tomography revealed a phlegmon in the retropharyngeal space and supportive lymphadenitis. Infectious disease and otolaryngology were consulted. She was placed on intravenous antibiotics as well as topical ciprofloxacin and dexamethasone for presumed otitis externa. Excisional biopsy of her lymph nodes revealed only noncaseating granulomas. Otomicroscopy revealed parakeratosis and extensive chronic inflammation without evidence of organisms. She was discharged 3 days after admission with antibiotics for a presumed diagnosis of lymphadenitis and her previously prescribed aspirin.

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The patient returned again to the emergency department 9 days later. She presented with worsening neck swelling and purulent sanguineous drainage from a previous excisional biopsy site as well as continued ear drainage despite compliance with antibiotics. The lymph node abscess culture from both the fine-needle aspiration and biopsy did not reveal bacterial growth, but fungal and acid-fast culture results were still pending. A repeat neck ultrasound revealed phlegmon versus abscess of the left side of the neck, slightly improved from previous study.

At this time, our admitting hospitalist team decided to perform a diagnostic time-out. Because of the patient's lack of improvement despite appropriate treatment, the initial diagnosis of incomplete KD with lymphadenitis needed a closer examination.

### THE VALUE OF A DIAGNOSTIC TIME-OUT

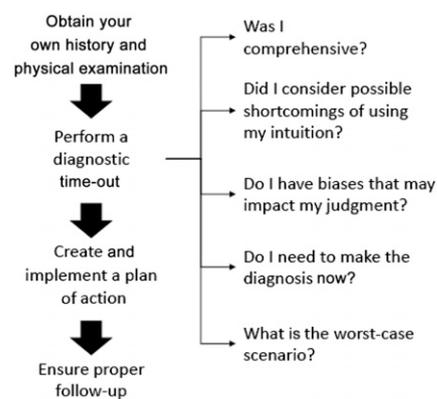
Diagnostic error is a frequently discussed topic in medical literature, especially given the estimated diagnostic error rate of between 10% and 15%.<sup>1-5</sup> Although there are many causes of diagnostic error, cognitive error is a predominating factor.<sup>3,5,6</sup> Cognitive error is impacted by how we think and the inherent biases we face.<sup>3,5,6</sup> The dual process theory suggests that the majority of our time is spent in intuitive thinking based on associations and heuristics. These decisions are made quickly, without much effort, and commonly lead to errors.<sup>3,7-11</sup> Less time is spent in the analytical reasoning style, which is slower and requires more effort but is often more reliable and with fewer errors as a result.<sup>7-11</sup> As physicians, we rely heavily on associations and illness scripts to arrive at a diagnosis and implement appropriate treatment.<sup>7,9</sup> As we progress through training, caring for patients becomes less of an analytical process and more of an intuitive one.<sup>3,7</sup> In addition, cognitive biases can greatly impact our medical decision-making process.<sup>3,6,7,12</sup> More than 100 types of cognitive biases have been described, each providing a unique challenge to overcoming potential cognitive errors.<sup>3,6,7,12</sup>

Although there are many approaches to reducing diagnostic error and reevaluating

patient cases,<sup>6,7,13-15</sup> our team used a diagnostic time-out, as proposed by Ely et al<sup>9</sup> and demonstrated in Fig 1. Using this exercise forced our minds to transition from intuitive to analytical reasoning. To perform a diagnostic time-out, it is important for providers to conduct their own history and physical examinations to formulate an initial differential diagnosis. After this, it is important to take time to reflect. During this reflection, providers must ask themselves if they were comprehensive in their approach to the diagnostic dilemma. Additionally, providers are encouraged to examine any biases that could influence their judgment. Does a diagnosis need to be made immediately, or can it wait? Does the natural course of the disease suggest a new diagnosis? Reflecting on the worst-case scenario may also aid in this period of reflection. At this point, the providers can create a plan of action. However, when embarking on this plan, it is important to acknowledge and communicate areas of uncertainty as well as the importance of follow-up.

Simply stopping to reflect and question a diagnosis adds significant value to care. With a diagnostic time-out, providers can hasten the initiation of appropriate therapies and avoid inappropriate therapies or testing that has subsequent downstream implications.<sup>9</sup> Also, this recognition can drastically change the long-term prognosis and associated morbidity and mortality.<sup>6,14,16</sup> In cases such as prolonged fever and lymphadenopathy, which depend heavily on clinical findings and can often suggest multiple types of disease processes, the utility of performing a diagnostic time-out can be a high-yield and value-added practice.

The diagnostic time-out encompasses many accepted strategies to overcome cognitive biases, including but not limited to developing awareness about inherent biases surrounding the diagnosis, encouraging providers to consider alternative diagnoses, metacognition (reflecting on the thinking process), minimizing time pressures, establishing accountability, and follow-up.<sup>6</sup> Because of



**FIGURE 1** Steps to performing a diagnostic time-out.

this, the time-out provides a comprehensive approach to examining a diagnosis.

### PATIENT COURSE

When performing the diagnostic time-out on this patient, our patient's course was inconsistent with the initial diagnosis of incomplete KD. Furthermore, her lack of response to multiple antibiotics after the drainage of her neck abscess also did not fit typical cervical lymphadenitis.<sup>17</sup> We recognized multiple cognitive biases that were impacting our medical decision-making, including anchoring, diagnostic momentum, and premature closure.<sup>6,9</sup> As a result, we created a more comprehensive differential diagnosis, which ultimately led our team to the presumed diagnosis of nontuberculous atypical mycobacterial infection due to its chronic unilateral nature, lack of response to previous antibiotics, abscess formation, drainage from the biopsy site, and classic location.<sup>18</sup> Closer inspection of the purified protein derivative skin test result, which had previously been read as negative, revealed induration to 9 mm, which is consistent with the weakly positive results often seen in atypical mycobacterial infections. A quantiferon gold result was negative. Acid-fast bacilli cultures from the excisional biopsy and drainage were pending at the time of discharge. She was switched to azithromycin and rifampin and was discharged 2 days after admission.

She followed up with infectious disease 3 weeks and again 2 months after discharge and had marked improvement of her

symptoms, and her adenopathy resolved. Antibiotics were discontinued. She has required no further hospitalizations or emergency department visits.

Cardiology agreed that she likely did not have atypical KD and did not need to continue aspirin or receive a follow-up echocardiogram.

## CONCLUSIONS

Our patient had an initial diagnosis of incomplete KD complicated by superimposed lymphadenitis. However, despite intravenous immunoglobulin therapy, multiple antibiotics, and surgical intervention, she did not improve and subsequently had worsening of her symptoms, prompting 2 additional hospitalizations over a several-week course. Implementing the diagnostic time-out helped our team arrive to a presumed diagnosis of nontuberculous mycobacterial infection and provide her with the appropriate treatment. By doing this, we were able to avoid further costly studies and follow-up appointments and discontinue her aspirin therapy. It is possible that if a diagnostic time-out was performed earlier, it may have prevented readmissions, multiple antibiotic courses, fewer procedures, and less stress on the patient and family. Ideally, a diagnostic time-out should be performed on admission and be revisited throughout the patient's stay as more information is available, especially if the patient fails to respond as expected, as well as after patient handoffs.

Prolonged fever and lymphadenopathy can cause diagnostic challenges because the differential is often broad.<sup>16</sup> In addition, the diagnosis of nontuberculous atypical mycobacterial lymphadenitis is not often straightforward, with researchers reporting a delay of 8 to 12 weeks in 44% of cases before the patient is referred for evaluation by a specialist.<sup>19</sup> These confounding factors thereby increase the value of performing a diagnostic time-out. This tool is used by several hospitalists at our institution during

times of diagnostic dilemma and when a patient is not following the expected trajectory. Diagnostic time-outs encourage providers to think more critically about patients and their diagnoses.<sup>9</sup> Furthermore, time-outs aid in alleviating cognitive biases when they are present. As a result, performing diagnostic time-outs could lead to better patient outcomes and overall value for the patient, family, and system. When patients are not following the expected trajectory or present a diagnostic dilemma, make time for a time-out.

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