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The Association Between Symptom Onset and Length of Hospital Stay in 2019 Novel Coronavirus Pneumonia Cases Without Epidemiological Trace

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Abstract: Objective: Compared to COVID-19 cases with established epidemiological trace, little is known about the patients without one. This study reports an association between time of symptom onset (TOS) and length of hospital stay (LOS) in COVID-19 infection without epidemiological link.

Methods: Generalized linear regression models were used to examine the association between symptom onset and primary outcome LOS. A group of patients with established epidemiological link in same medical facility during that period of time were used as controls.

Results: A total of 38 COVID-19 patients were admitted, 26 of which were found without travel history to infected area or direct contact with a case-patient. TOS was negatively associated with LOS in patients without epidemiological trace (IRR = 0.980; 95% CI = 0.967 to 0.993; P = 0.003).

Conclusions: In COVID-19 cases without typical epidemiological links, patients with later symptom onset had relatively shorter LOS.

Keywords: COVID-19 - Epidemiology - Novel coronavirus - Computed tomography - Infection

METHODS

This study was approved by the ethics commissions of the hospitals, with a waiver of informed consent. Patients in the present study were admitted in YongJia County People’s Hospital from January 23, 2020, to February 11, 2020. During the hospitalization, oral swabs and blood samples were collected and sent to the Center for Disease Control and Prevention in China for identification of COVID-19 using a reverse transcription polymerase chain reaction (RT-PCR) assay. All patients had genetic confirmation of COVID-19 and recovered after standard care. According to “Guidelines for the Diagnosis and Treatment of Novel Coronavirus (2019-nCoV) Infection by the National Health Commission” (issued by Center for Disease Control and Prevention in China), indications for discharge were set as symptoms relief combined with negative RT-PCR. Cases with travel history to infected area were the patients who have a trip to Hubei province, the epicenter of COVID-19 in China. Epidemiological investigation separated samples into two groups (patients with epidemiological trace vs patients without one).

First case in the sample had symptoms onset on January 17th. TOS is defined as the time interval from January 17th to the date of symptom onset for each individual. The primary outcome was LOS, defined as the duration of admission to discharge. Generalized linear regression models were used to examine what independent variables significantly predict the primary outcome LOS.

RESULTS

A total of 38 patients were admitted. Epidemiological investigation showed that 26 patients neither had travel history to infected area nor had a direct contact with a case-patient. Potential epidemiological links of these patients were listed as travel to non-infected area, visit shopping mall, attend dinner party, and contact with healthcare facility. Patients presented with symptoms of cough, fever, diarrhea, sore throat, and chest pain. No respiratory support of non-invasive ventilation or extracorporeal membrane oxygenation (ECMO) were applied. All individuals had images of consolidation or ground-glass opacification on computed tomography scan. In patients without epidemiological trace, TOS was negatively associated with LOS (IRR = 0.980; 95% CI = 0.967 to 0.993; P = 0.003). No such pattern was found in patients with established epidemiological link (IRR = 0.997; 95%
CI = 0.984 to 1.010; P = 0.633). Age was positively associated with LOS in both groups (Table 1).

DISCUSSION
The current coronavirus outbreak around the world shared different epidemic characteristics from those in the early stage. More patients without travel history to infected area or direct contact with a case-patient were diagnosed with COVID-19. Although full scale of review showed no epidemiological link, several potential risks were found. For example, a few patients were diagnosed with COVID-19 after a trip to non-infected area, indicating a potential larger epidemic area and an underestimated spread rate of virus. Shopping mall and catering business posed a high risk of infections, given the outbreak of COVID-19 in spring festival. In addition, special care should be taken to limit visits to hospitals for treating chronic diseases such as hypertension and diabetes.

As the global COVID-19 epidemic continues to grow, it’s crucial to understand the predictors of LOS to facilitate a better deployment of medical resources. In this study, elder patients were more susceptible to longer LOS, which was consistent with previous study. In addition, TOS was found to be negatively associated with LOS, indicating that the course of this disease was potentially impacted by mode of transmission. Given the late onset of symptom accompanied with short LOS, it appeared that the severity of virus may decline over time. Future studies may focus on the identification of modes of transmission other than travel to infected area or direct contact with a case-patient. Our finding of shorter LOS among cases with later symptom onset could contribute to optimized distribution of medical resource and risk-stratified approach to therapy in COVID-19.

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None.

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