

Using Social Networks for Tele-consultation on the Covid-19 Clinical Coding: A Quality Improvement Approach for Health Policy Making

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Abstract

Objective: The accuracy of clinical coding in COVID-19 is essential for quality of care, disease surveillance, as well as research and reporting. This study aims to describe and categorize consultations between medical coders based on the social media network in Iran on the COVID-19 coding. **Method:** A clinical coding group in the social network at the national level in Iran was established to follow consultation regarding COVID-19 among coders. We also utilized an online survey, which was designed to extract the problems coders encountered during clinical coding and their opinion on whether these consultations were effective. Herein, we report messages and communication records exchanged among members of this network obtained between 21 February 2020 and 20 November 2020. Finally, we categorised the obtained information and identified the problems for COVID-19 accurate coding in Iran. **Results:** A total of 1,340 messages in 332 consultations were exchanged amongst 76 coders. We categorised topics of consultations into 11 categories. Most consultations dealt with “suspected or probable” (n = 71), “clinical coding and diagnosis” (n=59) within 332 conversations. In 47% of consultations, the first reply was less than 10 ± 3 min. “Maternal and infant ” and “procedures and drugs ” were the most common subjects with specific answer. Based on the viewpoints of coders, online consultations can reduce the time of clinical coding and increase coding accuracy. **Conclusion:** The establishment of social networks among medical record coders is an efficient strategy to deal with coding issues during the COVID-19 pandemic and improve the quality of hospital records.

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Running Title: Improving the Covid19 clinical codes by Tele-consultation

Abstract

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The accuracy of clinical coding in COVID-19 is essential for quality of care, disease surveillance, as well as research and reporting. This study aims to describe and categorize consultations between medical coders based on the social media network in Iran on the COVID-19 coding.

Method :

A clinical coding group in the social network at the national level in Iran was established to follow consultation regarding COVID-19 among coders. We also utilized an online survey, which was designed to extract the problems coders encountered during clinical coding and their opinion on whether these consultations were effective. Herein, we report messages and communication records exchanged among members of this network obtained between 21 February 2020 and 20 November 2020. Finally, we categorised the obtained information and identified the problems for COVID-19 accurate coding in Iran.

Results :

A total of 1,340 messages in 332 consultations were exchanged amongst 76 coders. We categorised topics of consultations into 11 categories. Most consultations dealt with “suspected or probable” ($n = 71$), “clinical coding and diagnosis” ($n=59$) within 332 conversations. In 47% of consultations, the first reply was less than 10 ± 3 min. “Maternal and infant ” and “procedures and drugs ” were the most common subjects with specific answer. Based on the viewpoints of coders, online consultations can reduce the time of clinical coding and increase coding accuracy.

Conclusion:

The establishment of social networks among medical record coders is an efficient strategy to deal with coding issues during the COVID-19 pandemic and improve the quality of hospital records.

Keywords:

Covid-19, Clinical coding, Codes accuracy, Consultation, Disease surveillance, Social network

Introduction:

World Health Organization (WHO) identified the novel coronavirus disease 2019 (COVID-19) as a pandemic in March 2020¹. The pandemic has impacted the world economy negatively, as well as social and personal health across the globe. A thorough analysis of the current state of the pandemic and the appropriate associated solutions such as allocation of resources to medical centres and launch of new field hospitals requires an accurate evaluation of the number of confirmed and suspected cases and their state of health. Moreover, a true assessment of disease symptoms and the ongoing therapeutic interventions and associated outcomes can facilitate future informed therapeutic decisions.

Medical record codes are considered to be one of the most important pieces of administrative data². The International Statistical Classification of Diseases and Related Health Problems (ICD) is a medical classification list of codified standard diagnoses introduced by the WHO. This standard is updated regularly and has so far reached its 10th revision (ICD-10). Different countries have developed their native variations of these standards, tailored to meet their specific healthcare requirements. For instance, a variant of ICD-10 named ICD-10-CM has been developed and adopted in the United States³.

These kinds of codes are useful for the processing of reimbursement claims, clinical and epidemiological studies, quality of care and also used for reporting disease surveillance and monitoring⁴. ICD-10 standards have preserved levels of coding for new types of disease (U codes). For the case of COVID-19 pandemic, there is a preserved "U" character assigned for this disease.

Reports of surveillance and monitoring of the COVID-19 pandemic is directly linked to the accuracy of clinical coding in accordance with the WHO coding guidelines⁵⁻⁷. However, due to the unprecedented and unknown nature of this novel disease, future modifications of the introduced codes might be needed, which, in turn, may require changes of the codes used for medical records. Moreover, changing diagnostic methods, e.g., computerized tomography (CT) reports have created some problems for the accurate coding of medical records. In particular, during the first month of the COVID-19 outbreak in many countries, coding practices were inconsistent. Patients were discharged before guidelines had been made available and different codes were also released in succession^{8,9}.

The process of notifying and training coders is an important step in maintaining the accuracy of data. Despite the heavy financial burden of the current pandemic on healthcare systems, careful attention should be paid to meet coding standards¹⁰. Documented guidelines alone do not seem to be adequate to address the questions and problems raised by coders.

More recently, social networks have attracted a lot of attention for online consultations. There are systematic reviews that highlight the value of social media for healthcare communication and interventions¹¹⁻¹³. Some studies emphasise the effectiveness of social media in different areas of healthcare consultation such as plastic surgery¹, emergencies¹⁴, orthopaedics¹⁵, and oral or maxillofacial surgery¹⁶. Also, over the course of COVID-19 pandemic, governmental organizations have attempted to use internet-based technologies and telehealth (defined as the use of telecommunication technologies to support long-distance clinical health care and patient data^{17,18}) to overcome problems arising from the pandemic through online monitoring and follow-up of patients with chronic disease and people with initial symptoms of COVID-19¹⁹⁻²¹. For example, in China, an online mental counselling application has been implemented in an attempt to overcome the psychological stress exerted by the COVID-19 situation²². Baptista Silva et al. mentioned that health managers need to use remote consultations to improve services and provide care from a human rights perspective²³. Sabrir et al investigated the effects of WhatsApp video consultation on patient admission and discharge times in comparison to bedside consultation during the pandemic. Consultation via WhatsApp reduced both contact time with patients with COVID-19 and the number of medical staff contacting the patients, which contributes greatly to reducing the risk of COVID-19 transmission²⁴. Xu et al. evaluate a telemedicine model that was developed to address the challenges of treating patients with progressive COVID-19 based on a popular social media smartphone app called WeChat. The telemedicine system was useful for medical staff to identify disease progression and, hence, make appropriate and timely treatment decisions²⁵. Abbas et al. mentioned positive effects of educating people through social media platforms to reduce the mental health consequences of the COVID-19²⁶.

The ability of smartphones to transmit voice, text, images, videos and other multimedia messages has made them an effective and popular messaging tool. Today, smartphones are ubiquitous and almost everybody, including health professionals, in different countries make use of them²⁷.

In this study, we assessed the efficiency of using tele-consultations between clinical coders based on the social network to solve COVID-19 clinical coding problems and reduce coding time. Consultations were gathered over a 10-month period since the onset of the pandemic in Iran. Also, we evaluated the expediency of code setting and use by investigating the categories of consultations in coding groups.

Methods:

At the beginning of the pandemic, there were many issues related to coding. As such, we used a clinical coding group in the social network named "medical coding" which attracted senior (expert coders with high level of work experience) and junior (new coders with low level of work experience) coders throughout Iran. A coder is the person who enters the final diagnosis codes according to medical records and International Statistical Classification of Diseases (ICD) guidelines. The social network medium was used to facilitate rapid communication and consultation, and to discuss unique or difficult cases. This medium also benefitted junior coders in small cities who used it for communication with senior coders. The first COVID-19 cases in Iran were identified on February 19 2020. Therefore, we started the analysis and recording process for a period of ten months starting in February 2020, covering 21 February 2020 to 20 November 2020. The research received ethical approval from the Ethical Committee of Mashhad University of Medical science, Faculty of Medicine (Approval Number: IR.MUMS.MEDICAL.REC.1399.612).

Study design:

We used a coding group established for clinical coding in Telegram. We used this group for COVID-19 coding consultations. The analysis was done on the consultations (messages were exchanged between coders). The inclusion criteria were messages which contained consultation requests about COVID-19 coding, while all messages about general news of COVID-19, prevention protocols and guidelines about access to COVID medical records were excluded.

Some factors such as message numbers, types, and contents were recorded. Also, the purpose of messages, response times (time until the first reply), total time of consultation (lengths of data transmission), and number of persons involved in consultations were evaluated. Other noted fields were final conclusion (whether consultations were entirely responded to), the time of questions and replies and their compliance with office hours.

We also sent a survey to participants in COVID-19 consultations and collected information about coders themselves. Information including age, gender, workload, educational level, as well as province and city of residence were collected. Moreover, we asked about the problems coders encountered during COVID-19 clinical coding and their opinion on whether these consultations were effective. Finally, participants indicated whether they agreed to use their personal information as a research report. Issues mentioned in the surveys by coders were analysed and the associated themes were extracted.

Participants were asked to read and observe group instructions. If these instructions were violated, they would be warned for the first time and removed from the group following a first warning. These instructions included not sending irregular messages, observing ethical and professional principles in conversations, not sending messages containing links, and avoiding using extra compliments to keep the group busy. Discussions about the codes were free, but three expert coders always checked the final answers for accuracy.

We used some bots to manage sent messages and remove potential advertising messages.

Statistical analysis:

All statistical analyses were done using IBM SPSS software version 21 for Windows and continuous variables reported as means $\pm$ standard deviations (SDs). Categorical variables, such as the final conclusion and type of consultation request, were compared using the chi-square test and were expressed as counts with percentages.

A p -value < 0.05 was considered to reflect statistical significance. The computational factors were computed with excel.

Also, a geographic information system (GIS) analysis of the locations of coder residence was conducted to show the physical dispersion of the consultation requests. Trends of consultation requests within these ten months were examined and reported.

Results:

A total of 2,070 messages were evaluated. Out of these, 730 messages did not meet the inclusion criteria and were excluded. In the remainder, 1,340 messages of different formats, including text, image and file messages, were examined. Of the 1,340 messages, 1,233 (92%) were text messages, 67 (5%) images and 40 (3%) in the form of files. The messages were grouped together in 332 consultations that were categorised into 11 categories. As seen in Table 1, most of the consultations dealt with “suspected or probable cases” ($n = 71$), “clinical coding and diagnosis documentation instructors” ($n=59$) and “extra codes” ($n=35$). The average time to the first reply was 60 ± 6 min (about 80% of response) and the average duration of consultation was 60 ± 4 min, while the first reply in 47% of the consultations lasted less than 10 ± 3 min.

Table 1 about here

A total of 76 coders with different educational levels and experiences were involved in consultations. Table 1 shows these coders’ characteristics. Two senior coders produced more contributions, with 272 and 150 messages out of a total of 1,340 messages. Fig 1. Shows the distribution of coders involved in consultations in different Iranian provinces during the period of time studied.

Table 2 and figure 1 about here

On average, 3 persons (range: 2-8) participated in a given consultation. Also, an average of 4 messages (range: 2-20) were exchanged in every consultation (not including daily routine messages such as thanks, goodbye, etc.). In 20% (76 cases) of the consultations, there were no certain answers. Most of them dealt with “maternal and infant cases”, “procedures, drugs and ICU cases”, “other diseases with contact with and exposure to COVID-19 or COVID-19 history”. In 158 (47.5%) cases, consultations were concluded during work hours (both requests and first reply messages). In 182 (54.8%) cases, request messages were concluded during work time and in 149 (45.1%) cases, the first responses were also during working hours. A significant relationship between consultation categories and final conclusion (consultation had certain answer or not) was observed ($\chi^2 = 89.539$, $p = < .001$). The degree of significance was calculated using Cramer’s V test as 0.550. Table3 describes the details of the goodness of fit.

Table 3 about here

The time trend for first 3 categories of consulting requests is shown in Figure 2.

The Figure 3 and 4 show the trend of COVID-19 and death of it in Iran²⁸

Finally, based on the analysis of coders’ surveys and consultations, some issues which needed more transparency for accurate coding were extracted as follows:

- Discharge against medical advice in the initial stages of the onset of the COVID-19 pandemic can distort the related COVID-19 statistics in future medical reports.
- For coding of deceased cases, in particular in the elderly population and those with pre-existing conditions, identification of the underlying cause of death was the most important challenge as observed by coders.
- Coding of pregnancy deliveries by suspected COVID-19 mothers and screening of new-borns and pregnant women.
- With the gradual increase in the number of COVID-19 cases and deployment of different therapeutic interventions and clinical trials, coding of procedures and ICU cases were new topics of discussion among coders which had no definitive answer.

- In COVID-19 cases, there were unanswered or indefinite queries cases such as: "maternal and infant cases", "procedures, drugs and intensive care unit (ICU) cases" and "other diseases with contact with and exposure to COVID-19 or having had a COVID-19 history".

From the viewpoint of coders, these remote consultations were helpful and effective, especially during code allocation for the purpose of increasing the transparency and accuracy of coding.

Discussion:

Coding of COVID-19 medical records is important in terms of assessment of the current status and decision making as well as global management of the pandemic. Moreover, this can serve as the basis for future research on the effectiveness of medications and novel therapies. Thus, accurate coding of diagnosed and suspected COVID-19 cases with or without pre-existing conditions such as diabetes and hypertension is very important.

In this study, we used social network consultation to solve COVID-19 coding problems and exchange experience between clinical coders. We also used a survey to extract the viewpoints of participants. Based on these viewpoints, coding consultations were useful and reduced coding time and increased the accuracy of COVID-19 codes.

The most frequent topics of consultation included "Suspected or Probable cases", "Clinical coding instructors and diagnosis documentation" and "Extra codes and clinical signs and symptoms". Results of the current study revealed that using social networks is an efficient method for solving the problems faced by coders and exchange of coding instructions. An analysis of the questions raised by coders can provide health authorities with the knowledge to extract problems faced by coders and offer appropriate solutions. Based on the participants' view, deploying social networks can reduce COVID-19 coding inconsistency caused by lack of skills. This happens by establishing an interactive communication between more experienced senior coders and junior coders, as well as those in under-privileged cities. This can potentially lead to improved problem solving and coding quality, and more accurate international reports by policy makers in light of the ongoing pandemic crisis. The trend of three most frequent consultation requests is shown in figure2. A comparison of this trend with that of COVID-19 and associated death rate indicates that in the 4th and 5th months of pandemic when death rate statistics were almost increasing coincides with the time frame when coding structures were constantly changing in line with the volatile nature of the pandemic. This is also the time period when requests about suspected cases and coding instructions increased. But, 10 months after the start of the pandemic in Iran at the start of the second wave, requests related to coding additional status increased.

New codes are regularly delivered to coders in the form of instructions. However, the un-interactive nature of instruction delivery and lack of orientation programs or other forms of educational guidelines has resulted in coding inconsistencies. The use of smartphones and social networks is becoming an increasingly popular interaction tool among health professionals, which can be used to improve the quality of coding. In light of the recent Covid-19 pandemic, the use of smartphones and social networks has drawn more attention. For instance, radiologists are using the WhatsApp platform for overseas diagnosis consultations. In a study involving a group of 11 radiologists, CT images were shared to seek consultation on possible diagnosis of COVID-19²⁹. Online management of mental problems and monitoring of suspected COVID-19 cases are other examples of the use of internet-based technologies and social networks¹⁹. A scoping review that investigated COVID-19 remote consultation services mentioned that health managers need to use remote consultations to improve services and provide care from a human rights perspective²³. The same platform can be used for effective communication between coders, and faster and more reliable exchange of ideas and coding instructions. Moreover, this platform can be used to share the experience of more senior coders, which can be of benefit to junior coders. However, preserving the privacy of patients is an important concern, especially when dealing with images of medical records³⁰.

The studies on the use of social networks for professional consultation reveal that they have facilitated the decision process and reduced the time span^{1,16}. For example, in a study by Wani, who investigated the

efficacy of communication amongst staff members in a department for plastic and reconstructive surgery, showed that consultation times can be reduced ¹. According to the instructions by the health authorities in Iran, in-patient medical records should be coded online. As such, receiving a response to a consultation in one working day is acceptable. This implies that reducing the response time as well as accurate medical record coding is of high importance. Our results show that 80% of consultations reached a final decision and 47% of response times that were shorter than 10±3 min. It was seen in our study that at least three individuals participated in a given consultation, and in more complicated cases, at least one senior coder also participated in the process.

Given the limited number of reserved codes for COVID-19, coding of COVID-19 records may not seem difficult. However, a few items need to be taken into account; First, because of the novel nature of the current pandemic, the coding standards are evolving over time to account for previously unknown side effects, diagnostic methods, and associated therapeutic interventions. At the beginning of the pandemic, only a single code was assigned for COVID-19 cases. This was later complemented to include suspected cases, Covid-19 in pregnancy, specific organ damage, blood clotting effects, etc. Therefore, coding of diagnoses and procedures has also evolved over time since the onset of the pandemic. Second, COVID-19 cases were originally diagnosed as pneumonia and nothing else in many countries, and therefore the appropriate diagnostic tests were not requested for these patients ⁸. In addition, diagnostic kits were required for the definitive diagnosis. However, because of their unavailability, test results were not always recorded in many medical records. Because of the low sensitivity of the tests (60% to 70%) ³¹, the final diagnosis has sometimes been identified as COVID-19 clinically by physicians despite negative test results. Since the coder is required to comply with the clinical diagnosis and is not allowed to make changes at their own discretion, this results in a discrepancy between what they identify as the final diagnosis and the instructions provided by the health authorities. Third, CT scans gradually started to be deployed as part of the diagnosis procedure for COVID-19 cases after the start the pandemic. Accordingly, these were accounted for in the coding process for probable and suspected cases. The discrepancy between the final diagnosis by the clinician and the polymerase chain reaction (PCR) and CT test results was one of the consultation topics among coders. Using social networks can help healthcare providers to provide better services and use co-workers' experiences ³². However, there are studies that suggest that social networks may lead to increased anxiety in healthcare workers ³³ Thus, it is better that health professionals manage time spent on social networks.

Conclusion

In this study, we examined the efficiency of tele-consultations between clinical coders around the country. The consultation was done based on the social network about the COVID-19 coding problems. 80% of problems were answered in less than 60 minutes and 87% of coders found at least one certain answer for their questions. Based on the viewpoints of participants, tele-consultation using a social network platform reduced the time of COVID-19 coding and effectively handled coders' problems. Also, new coders who work in distant locations can use the experience of professional coders. It can also improve the quality of coding. These results can be used for future policy making.

Author's contribution:

Conception and design of study: *N.Hosseini, B.Kiani* Acquisition of data: *N.Hosseini, M.Hosseini, M.Sarbaz, K.Kimiafar*; Analysis and/or interpretation of data: *N.Hosseini, R.Bergquist, S.M Mostafavi*. Drafting the manuscript: *N.Hosseini, B.Kiani, S.M Mostafavi*; Revising the manuscript critically for important intellectual content: *S.M Mostafavi, R.Bergquist, K.Kimiafar, M.Sarbaz, N.Hosseini*, Approval of the version of the manuscript to be published (the names of all authors must be listed): *N.Hosseini, M.Hosseini, S.M Mostafavi, B.Kiani, R.Bergquist, K.Kimiafar, M.Sarbaz*.

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Conflict of interest

The authors declare no conflict of interest.

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