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Contents lists available at ScienceDirect

Advances in Oral and Maxillofacial Surgery

journal homepage: www.editorialmanager.com/adoms/default.aspx

Impact of COVID-19 pandemic on oral and maxillofacial surgery in Japan: A report from a questionnaire survey during the different phases of the pandemic

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ARTICLE INFO

Keywords:

COVID-19
SARS-CoV-2
Pandemic
Maxillofacial surgery

ABSTRACT

COVID-19 pandemic has provided a new challenge to healthcare systems and medical care providers. In the current study, we describe the challenges faced and actions taken to provide optimum healthcare in Japan during the COVID-19 pandemic based on the results of a questionnaire survey that was conducted by oral and maxillofacial surgeons. A total of 24 Japanese institutions participated in the study. The first survey was conducted between June 22, 2020 and June 26, 2020, and the second survey was conducted between October 23, 2020 and November 8, 2020. The questionnaire focused on the practical situation in the respondent's hospital, personal protective equipment (PPE) availability, and what alterations had occurred compared to the situation before the COVID-19 pandemic. The commonest reported duration of restrictions to the outpatient clinic was 1–2 months. All of the institutions had lifted their restrictions on outpatient services by September 2020. Surgical procedures in the operating room were restricted in 74% of hospitals in the first wave of the pandemic; however, 88% lifted their restrictions and restarted their regular surgical services by November 2020. Although, non-urgent or elective procedures were delayed, surgeries for malignant tumors, maxillofacial infections, and trauma were performed at almost all hospitals during the pandemic. Health care institutions will require a new approach to maintain patient volume and recover from the pandemic. Going forward, it is also necessary to minimize the risk of exposure and transmission to health care personnel as well as patients.

1. Introduction

On January 30, 2020, the World Health Organization (WHO) formally announced the novel coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) to be a “public health emergency of international concern” and, shortly thereafter, on March 11, 2020, they officially declared the COVID-19 outbreak to be a “pandemic,” at which point, there were 130,000 confirmed cases in 118 countries [1,2]. Since then, the COVID-19 pandemic has provided a unique challenge to healthcare systems and medical care providers in which many clinical services have had to restrict their routine clinical activities; many elective surgeries have been delayed [3,4].

Procedures in oral and maxillofacial surgery (OMS) are complex and involve a wide range of patient ages, patients with severe infection and

trauma that require urgent care, craniofacial anomalies in timely surgery is crucial, and oncologic surgery. Moreover, primary surgical management is recommended for oral cancer in both the early and late stages of the disease, which involves a multidisciplinary approach to improve survival [5]. OMS surgeons and other health care personnel who perform surgery of the aerodigestive tract are at high risk of exposure to the virus [6,7]. Thus, it is essential that OMS surgeons provide optimal treatment strategies for a variety of patients during the COVID-19 pandemic that will lead to lasting changes in treatment policy and protocol as well as surgery schedules, depending on the socio-political situation. Following the release of the national guidelines from the British Association of Oral and Maxillofacial Surgery on March 19, 2020, the Japanese Society of Oral and Maxillofacial Surgeons also released COVID-19 guidance for OMS practices on March 31, 2020, which recommended: the postponement of non-urgent elective procedures, restriction to the use of

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<https://doi.org/10.1016/j.adoms.2021.100069>

Received 8 March 2021; Accepted 16 March 2021

Available online 22 March 2021

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aerosol generating procedures (AGPs), and wearing of proper personal protective equipment (PPE) to keep medical care providers as well as patients safe. Since then, healthcare providers have been required to alter their services throughout the different phases of the COVID-19 pandemic.

The governments of many countries have instituted strict measures, including social distancing, working from home, closure of non-essential services, closure of schools, and lockdown [8]. The Japanese government also declared a state of emergency on April 7, 2020. Department of Maxillofacial Surgery Group services of Aichi Gakuin University operate at 24 different general hospitals and the university hospital across the central area of Japan, and is one of the leading units of OMS in the country. When Japan moved into the recovery and restoration phase of the COVID-19 pandemic after the first wave phase (March 2020–May 2020), the majority of our group's units restarted providing care at outpatient clinics as well as surgical procedures. In Japan, 426,456 people have been confirmed to have been infected, with a total of 7529 deaths as of February 23, 2021 [9]; these numbers are better than many other countries, considering that the estimated population of Japan is 125.7 million people. However, we are facing a more severe third wave, which might have a grave impact on health care systems.

The purpose of the current study was to examine the impact of the COVID-19 outbreak on OMS services, and how OMS surgeons managed patients and handled unusual situations that they faced in the different phases of the pandemic. In the current study, we report the situation in Japan during the pandemic through the results of a questionnaire survey that was sent to OMS surgeons in our group of hospitals.

2. Materials and methods

The current study was approved by the Institutional Review Board of Aichi Gakuin University, School of Dentistry (approval number: 606), and informed consent was obtained from all respondents. The questionnaire survey was conducted in a total of 24 facilities that participated in the current study. All of the responders were the department heads of OMS at their respective hospitals, which are part of the OMS group of Aichi Gakuin University. The hospitals that participated in the survey were mainly located in middle Japan island, including 16 in Aichi

prefecture, 4 in Mie prefecture, and 3 in Gifu prefecture, while one was located in the Hyogo prefecture in west Japan. The majority of these hospitals serve as regional referral hospitals, with emergency or urgent care services. The mean number of beds in participating hospitals was 459.1, which is larger than the mean of Japanese general hospitals (184.2) [10]. The statistics related to COVID-19 in Japan and the timeline of the questionnaire survey conducted are shown in Fig. 1.

The first survey was conducted between June 22, 2020 and June 26, 2020 by sending out a questionnaire via e-mail when Japan's first state of emergency was lifted. The second survey was conducted between October 23, 2020 and November 8, 2020, in-between the second and third waves of the COVID-19 pandemic. We used Google Forms to develop a questionnaire that included 20-items. The questions focused on the practical situation in the responder's hospital, personal protective equipment (PPE) availability, what changes they were facing during the outbreak, and what changes had occurred compared to 2019, the period before the COVID-19 pandemic. The questionnaire items were based on the previous worldwide survey by Maffia et al. [11].

2.1. Statistical analyses

Descriptive statistics were performed, and we compared the differences in routine clinical activities between the first and second waves of the COVID-19 pandemic, and compared these with the baseline before the pandemic in 2019. Fisher's exact test was used to test the differences in demographic features. Statistical significance was defined as $p < 0.05$. The statistical analyses were carried out using JMP Pro 15.0.0 (Cary, NC, USA).

3. Results

3.1. The impact of COVID-19 on outpatient clinics

Ten hospitals (42%) had restricted their clinical activities for 1–2 months, which was the commonest duration of restrictions overall (Fig. 2 left). Moreover, all of the institutions had lifted the restrictions on outpatient services by September 2020 (Fig. 2 right). Next, we compared

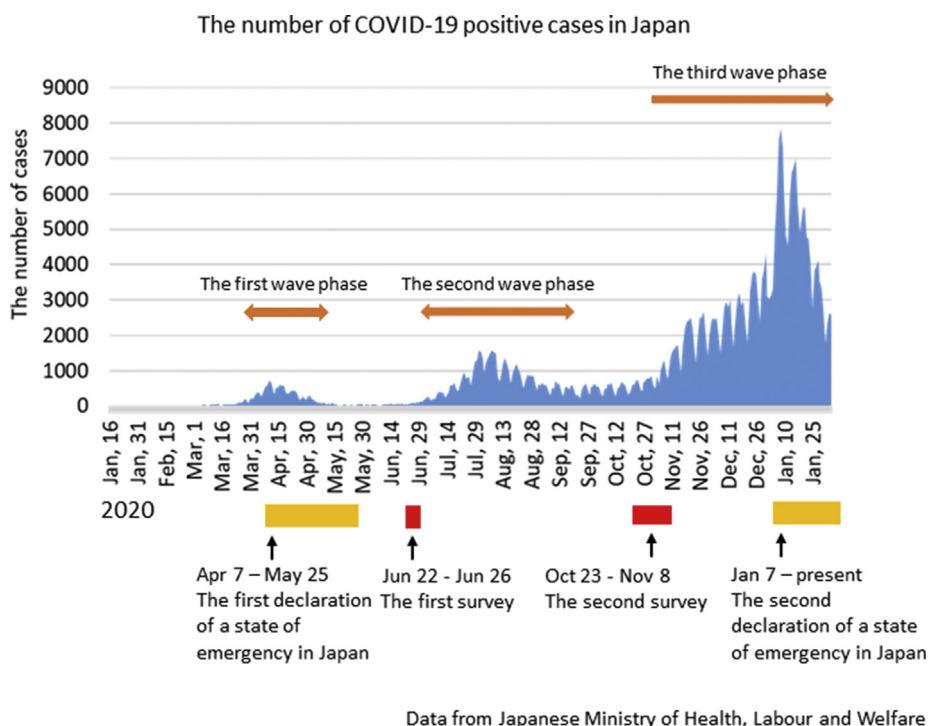


Fig. 1. The situation of the COVID-19 pandemic in Japan and the dates during which the questionnaire survey was conducted.

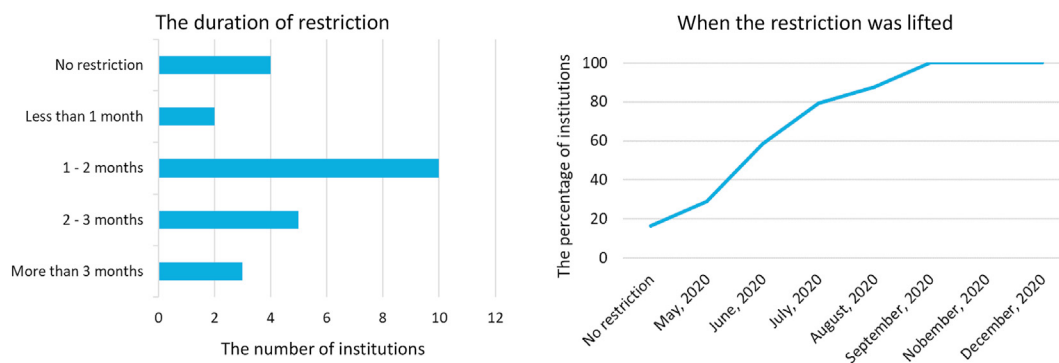


Fig. 2. The impact of the COVID-19 pandemic on outpatient clinics. The number of institutions which answered the question: “How long have you been restricting outpatient services during the outbreak?” (left). The percentage of hospitals that lifted restrictions on outpatient services (right).

the differences in activities between the first and second waves of the COVID-19 pandemic, as well as those with the year 2019. In the first wave, the percentage of activities (patient volume) was less than 90% compared to 2019 but varied widely; however, more than half of the participating institutions (58%) recovered to more than 90% activity compared to 2019 (Fig. 3 left).

3.2. Patient screening and management in outpatient clinics

The majority of institutions (96%) completed the hospital entrance questionnaire for patient screening (Table 1). Seventy-five percent of institutions refrained from performing AGPs, such as impacted teeth extraction and ultrasonic scaling. Nine of the twenty-four institutions (42%) used extraoral vacuum systems to reduce the exposure risk from AGPs during the first wave of the pandemic, and three institutions had installed new extraoral vacuum systems during the second wave (Table 1).

3.3. Surgical procedures performed in the operating room

Surgical procedures in the operating room (OR) were restricted in 75% of the hospitals in the first wave; however, 88% lifted their restrictions and restarted their regular surgical services in the OR by November 2020 (Table 1). When we compared the OR activity (case volume) in the first wave of the pandemic to the year 2019, 11 of 24 (46%) hospitals reported that their activity was less than 30%. However, 18 of 24 (75%) hospitals reported more than 90% activity relative to 2019 in the second wave (Fig. 3 right). Surgical procedures in the OR that were suspended during the pandemic are shown in Fig. 4. Malignant tumor resections with or without reconstruction, incision and drainage of abscesses, and open reduction for maxillofacial fractures continued at the majority of institutions during the pandemic.

3.4. PPE and guidelines

Sixty-seven percent of hospitals reported a shortage of PPE in the first wave of the pandemic. Even in the second wave, 42% of hospitals continued to have a shortage (Table 1). The most common PPE shortage in the first wave was N95 masks (58%), followed by disposable suits (54%) and surgical masks (50%), respectively (Fig. 5). Many hospitals established their own guidelines to face the outbreak (79% in the first wave; 88% in the second wave); however, less than half of the respondents felt safe when they treated their patients during the pandemic (Table 1).

4. Discussion

The Japanese government declared a state of emergency in relation to the surge of COVID-19 patients, implementing social distancing and “stay-at-home” requests on April 7, 2020; the declaration was lifted across Japan on May 25, 2020. We speculated that during this period, most institutions had restricted their services. We also saw a decrease in the spread of the second wave of the pandemic in September 2020, and it was speculated that all participating institutions had lifted their restrictions at this point and had restarted their regular services.

In the present survey, the majority of participants reported two screening methods to identify signs and symptoms of COVID-19 before patients visit the clinic, which was in line with a previous article from the United Kingdom [12]. This article also reported that in 62% of the clinics, patients always wore a mask during the consultation and presented evidence from a previous study that covering the mouth reduces droplet production [13]. As wearing a mask is commonly followed in Japan, we did not include an item regarding it our questionnaire. The COVID-19 pandemic has given us an opportunity to develop alternative paths to provide safe patient care with limited in-person interactions using

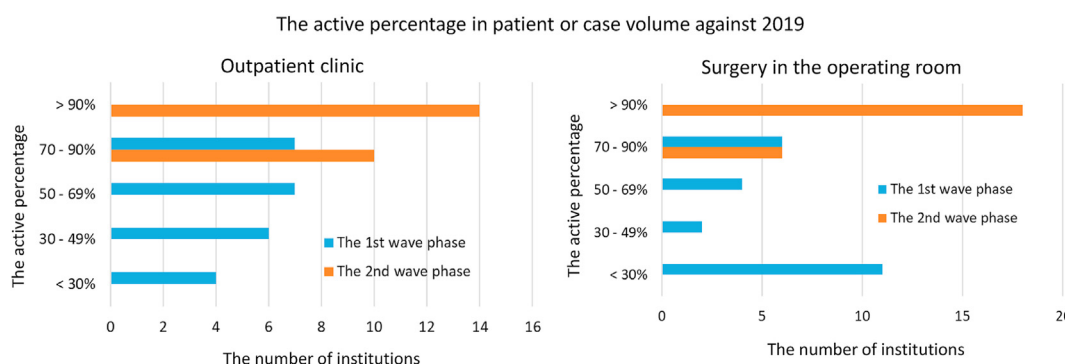


Fig. 3. The active percentages of patient volume of outpatient services compared with before the COVID-19 pandemic (left). The active percentage in case volume of surgery in the operating room compared with before the pandemic (right).

Table 1
Questions used for the survey and their answers.

Questions	n = 24 (%)		p
	First wave	Second wave	
Is your department still open?	Yes 24 (100%)	not asked	–
	No 0		
How did you manage outpatient clinic visits during the outbreak (one or more options)?			
Hospital entrance questionnaire	23 (96%)	not asked	–
Symptom screening by health care workers	20 (84%)		
Restriction on impacted teeth extraction	18 (75%)		
Restriction on ultrasonic scaling	18 (75%)		
Use of extraoral vacuum systems	10 (42%)		
Installation/expansion of partitions	9 (38%)		
Use of telemedicine	7 (29%)		
Minimized use of intraoral radiographs	5 (21%)		
Use of pre-operative mouth wash	2 (8%)		
Preoperative RT-PCR testing?	Yes 5 (21%)	8 (33%)	0.548
	No 15 (63%)	11 (46%)	
	If needed 4 (17%)	5 (21%)	
Preoperative chest CT imaging?	Yes 2 (8%)	4 (17%)	0.840
	No 14 (58%)	13 (54%)	
	If needed 8 (33%)	7 (29%)	
Stay at home request for two weeks before surgery?	Yes 5 (21%)	8 (33%)	0.670
	No 10 (46%)	8 (33%)	
	If needed 8 (33%)	8 (33%)	
Did you restrict surgery in the operating room?	Yes 18 (75%)	3 (12%)	<0.001
	No 6 (25%)	21 (88%)	
Hospital gave you enough protection?	Yes 6 (25%)	14 (58%)	0.042
	No 16 (67%)	10 (42%)	
	No answer 2 (8%)	0	
Hospital gave you guidelines?	Yes 19 (79%)	21 (88%)	0.701
	No 5 (21%)	3 (13%)	
Do you feel safe?	Yes 8 (33%)	10 (42%)	0.769
	No 14 (58%)	14 (58%)	
	No answer 2 (8%)	0	
COVID-19 patients hospitalized?	Yes 12 (50%)	15 (63%)	0.561
	No 11 (46%)	9 (38%)	
	No answer 1 (4%)	0	
Your department encountered COVID-19 patients?	Yes 0	6 (25%)	0.022
	No 23 (96%)	18 (75%)	
	No answer 1 (4%)	0	

teleconsultation services [14]. Indeed, 29% of our participants started to provide telemedicine services to decrease the risk of exposure to infection.

As for surgeries in the OR, the majority of participants' departments had restricted elective or nonessential procedures during the first wave of the pandemic. However, 88% of the participants had provided their

regular services in the OR until the second wave. Surgical procedures for infections, malignant tumors, and maxillofacial traumas continued to be performed during the pandemic in almost all institutions, similar to the results reported in Germany [15]. Maxillofacial and cervical infections of odontogenic origin often require surgical drainage in combination with antimicrobial therapy. Patients with severe infection further require more invasive and emergency treatment for life-threatening conditions. Previous articles have indicated that the COVID-19 lockdown led to delay in patients seeking treatment and presenting with more severe infection, subsequently increasing the risk of poor outcomes and requiring longer care in hospitals [16,17]. The majority of our participants' institutions serve as regional referral hospitals, with emergency care services. Therefore, they were able to offer prompt services for cases of severe infection.

There is a consensus that most types of cancer have a time window of approximately 4–8 weeks from the time of diagnosis to definitive surgical treatment [18]. The Head and Neck Cancer International Group has developed expert consensus recommendations for the management of head and neck cancer patients during the COVID-19 pandemic [3]; they found a strong consensus that it is not acceptable to delay stage I and II oral cancer surgery for more than 8 weeks from the time of diagnosis. In advanced head and neck cancers, they also reported a strong agreement that it is not acceptable to delay surgery beyond 4 weeks from diagnosis [3,19]. None of our participating institutions delayed surgery for oral cancer patients within the appropriate timeframe in accordance with the report.

Patients with maxillofacial trauma occasionally require emergent surgical procedures. However, consideration should be given to treat maxillofacial fractures as conservatively as possible during the pandemic [20–22]. There are several technical options to perform open reduction and fixation to reduce potential aerosolization, including: 1) the use of scalpel for mucosal incision; 2) the use of bipolar cautery for hemostasis; 3) the use of self-drilling screws; 4) when drilling is required, limit or eliminate using irrigation; 5) consider a battery-powered low-speed drill; and 6) the use of a transcutaneous approach [20,21,23]. It is crucial for OMS surgeons to decide which cases require surgical treatment even during the pandemic. An article from Italy, one of the first countries to suffer from devastation and resource constraints from the pandemic, reported that tumor and trauma surgeries have been widely provided during the pandemic, while other pathologies were delayed [24]. Our results also suggest that patients with complex maxillofacial fractures, severe head and neck infections, and operable oral cancer should not be delayed in receiving surgery.

This study has some limitations: 1) the frequency and types of emergencies the departments encounter were not studied; 2) the extent of the economic burden imposed by the pandemic on hospitals could not be assessed; and 3) our survey did not consider the hospital type and size. Although this study was not a nationwide survey, we believe that it provided representative data from Japan. Follow-up survey will be needed to identify long-term impact of COVID-19 to overcome possible outbreaks of unknown epidemics in the future. At present, we did not receive any information on nosocomial transmissions having occurred in our OMS group, although AGPs have been performed in almost all hospitals without enough PPEs, since the second wave of the pandemic. Further research is also required to assess the relation between infection rate and AGPs.

5. Conclusions

Most of OMS procedures were suspended during the early phase of the pandemic; however, surgeries for malignant tumors, traumas, and infections have been widely performed as crucial and live-saving

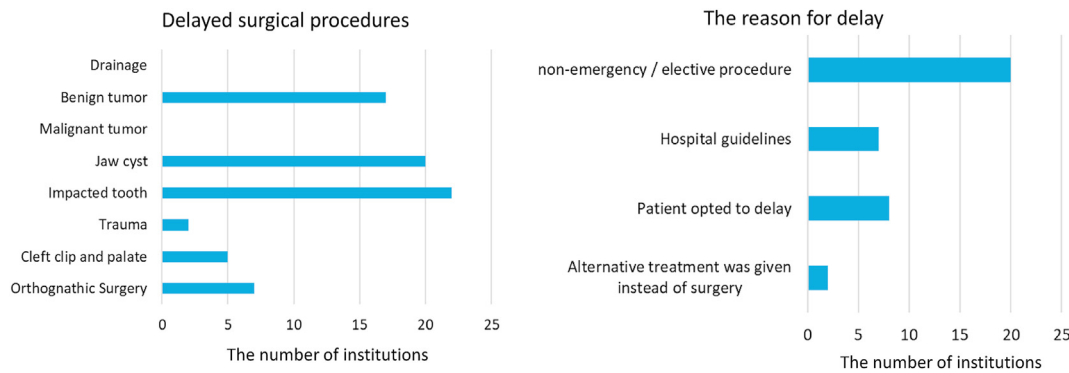


Fig. 4. Surgical procedures performed in the operating room (OR) during the COVID-19 pandemic. The number of institutions which answered the question: “What surgery have you delayed during the outbreak?” (left); “What was the reason for delaying surgery?” (right). (one or more options).

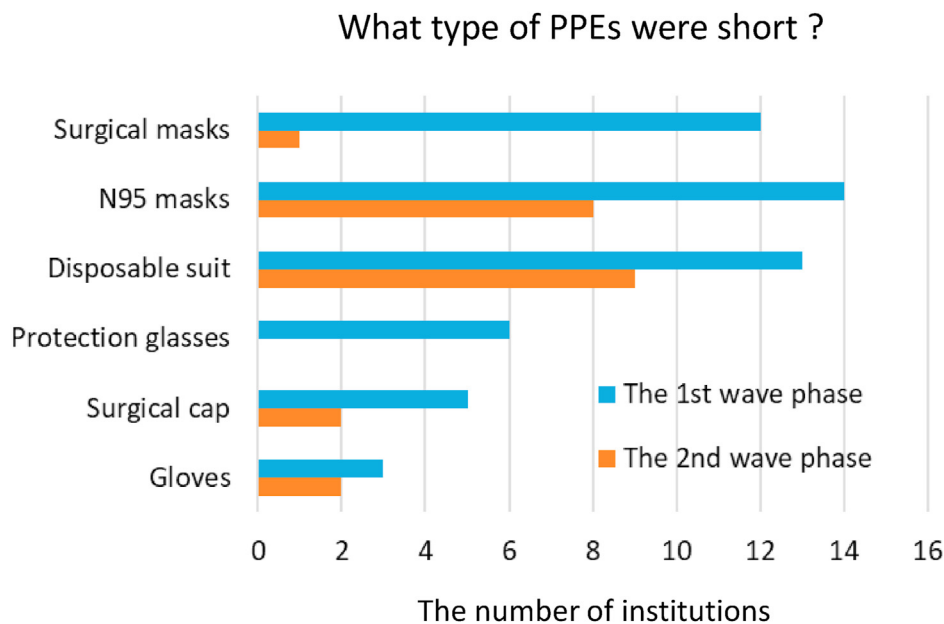


Fig. 5. The shortage of personal protective equipment (PPE). The number of institutions which answered the question: “What type of PPEs were lacking in supply?” (one or more options).

procedures even in the pandemic. The majority of our group have restarted and continued their regular OMS services since September 2020, just after the second wave. Japan began its COVID-19 vaccine rollout on February 17, 2021. This situation calls for a new approach by health care institutions in maintaining patient volume and providing safe medical care, regardless of their emergency status.

Ethics statement/confirmation of patients’ permission

The current study was approved by the Institutional Review Board of Aichi Gakuin University, School of Dentistry (approval number: 606), and informed consent was obtained from all respondents. Patient permission not required.

Declaration of competing interest

We have no conflicts of interest.

Acknowledgements

We would like to thank Editage (www.editage.com) for English language editing.

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