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ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ

Νοσηλευτικές παρεμβάσεις και μέτρα προστασίας κατά τη διάρκεια νοσηλείας ασθενούς με Αναπνευστικό Σύνδρομο Μέσης Ανατολής (MERS-coV). Μελέτη περίπτωσης

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ΠΕΡΙΛΗΨΗ

Το αναπνευστικό σύνδρομο Μέσης Ανατολής (Middle East Respiratory Syndrome-MERS) είναι μία αναπνευστική νόσος που οφείλεται σε ένα νέο κορωνοϊό (CoV) ο οποίος πρωτοεμφανίστηκε στη Σαουδική Αραβία το 2012. Στις 18 Απριλίου 2014, ένα εργαστηριακώς επιβεβαιωμένο περιστατικό λοίμωξης από MERS-CoV αναφέρθηκε στην Ελλάδα και συγκεκριμένα στην περιοχή της Αθήνας σε έναν ασθενή ο οποίος επέστρεφε από το Jeddah της Σαουδικής Αραβίας. Μέσα σε δύο ημέρες, ο ασθενής μεταφέρθηκε στη πανεπιστημιακή Μονάδα Εντατικής Θεραπείας (ΜΕΘ) του Νοσοκομείου Νοσημάτων Θώρακος Αθηνών. Στη μελέτη περιγράφεται η διαδικασία που ακολουθήθηκε κατά την περίοδο νοσηλείας του ασθενούς στο θάλαμο αρνητικής πίεσης μέχρι τη μεταφορά του στο περιβάλλον της γενικής ΜΕΘ, μετά από δύο αρνητικά εργαστηριακά αποτελέσματα για τον ιό MERS-CoV.

Λέξεις Κλειδιά: Αναπνευστικό Σύνδρομο Μέσης Ανατολής, MERS-CoV, έλεγχος λοιμώξεων, νοσηλευτική φροντίδα, μέτρα προστασίας.

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CASE REPORT

Nursing interventions and protective measures during hospitalization of a patient with Middle East Respiratory Syndrome -coV. A case report

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ABSTRACT

Middle East Respiratory Syndrome (MERS) is a respiratory disease caused by a novel coronavirus (MERS-CoV) that was first identified in Saudi Arabia in 2012. On the April 18nth 2014, a laboratory- confirmed case of MERS-CoV infection was reported in Athens, Greece in a patient returning from Jeddah, Saudi Arabia. Within two days the patient was transferred to Intensive Care Unit (ICU) in the Chest Infection hospital of Athens. In this article we report the procedure followed the period since patient's hospitalization in a negative pressure room until his transfer to general ICU where his laboratory results were twice negative for MERS-CoV.

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Keywords: Middle East Respiratory Syndrome, MERS-CoV, infection control, nursing care, protection measure.

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INTRODUCTION AND BACKGROUND

On the April 18nth 2014, a laboratory-confirmed case of Middle East Respiratory Syndrome (MERS-CoV) infection was reported in Athens, Greece in a patient returning from Jeddah, Saudi Arabia. Within two days the patient was transferred to Intensive Care Unit (ICU) in the Chest Infection hospital of Athens. The Hellenic Center for Disease Control and Prevention (HCDCP) informed the healthcare staff straight away for the appropriate protection measures. Here we report the procedure followed the period since patient's hospitalization in a negative pressure room (24 days) until his transfer to general ICU where his laboratory results were twice negative for MERS-CoV. No secondary cases of MERS-CoV occurred during this period.

MERS is a respiratory disease caused by a novel coronavirus (MERS-CoV) that was first identified in Saudi Arabia in 2012. Coronaviruses are a large family of viruses that can cause diseases ranging from a common cold to Severe Acute Respiratory Syndrome (SARS).[1] Coronaviruses are enveloped RNA viruses classified in alpha, beta and gamma genera. MERS-CoV is the first betacoronavirus isolated in humans.[2]

From September 2012 to June 2014 there have been reported[3] in European Centre for Disease Prevention and Control (ECDC) 815 laboratory confirmed cases of MERS-CoV infection, including among them 313 deaths. The cases are identified in four continents of the world. In Asia the cases classified as in Saudi Arabia (n=689), United Arab Emirates (n=70), Jordan (n=18), Kuwait (n=8), Qatar (n=7), Oman (n=2), Iran (n=2), Philippines (n=1), Malaysia (n=1) Yemen (n=1) and Lebanon (n=1). In Africa the cases are identified in Tunisia (n=3), in Algeria (n=2) and in Egypt (n=1). In America in USA (n=2) and in Europe in United Kingdom (n=4), in Germany (n=2), in France (n=2), in Netherland (n=2), in Italy (n=1) and in Greece (n=1). The Greek case was the 10th case of MERS-CoV in Europe.

The source of MERS-CoV infection is still remaining unclear. There is evidence for human-to-human transmission via close contact but the extent is limited. There is also a possibility of zoonotic origin of the virus. There are studies which have illustrated high genetic similarities to bat coronaviruses but others have showed a close link between the virus found in camels and that found in people.[4-6]

The typical symptoms of MERS infection include cough, fever and shortness of breath. Also gastrointestinal symptoms, like diarrhea or nausea can occur. More severe complications can follow in some cases, like pneumonia, organ failure (commonly renal), or septic shock. Individuals with chronic diseases, like cancer, heart, kidney disease or diabetes and people with weakened immune system appear to be at higher risk in dealing with the disease. In slighter cases infected people had mild symptoms or no symptoms at all.[7]

CASE REPORT

On the 20nth of April 2014 the first patient with identified MERS-CoV in Greece was admitted to the Intensive Care Unit with an APACHE II score equal to 19. He was intubated and mechanically ventilated due to his critical condition. The ambulance was carefully disinfected immediately after the transfer. A central venous and an arterial catheter, a folley catheter and a nasogastric tube were inserted into the patient immediately after his first ICU admission. He was provided with a 24hours hemodynamic monitoring. The negative pressure room was communicating to central ICU room through a camera and intercom. The clinical characteristics during hospitalization in negative pressure room are presented in Table 1.

According to the HCDCP instructions, from the 1st up to the 4th day, the health care team taking part to patient's treatment had to wear the appropriate protective clothing which included a high protection uniform/tyvek, a mask FFP2-N95, non-sterile gloves, eye-wear, hair and foot protection to the knee. Additionally the staff had to use antiseptic solution before and after every contact with the patient or his environment. From the 5th until to 24th day, the day that the patient left the negative pressure room, the high protection uniform was replaced with simple plastic gowns while the rest protective measures remained the same. In front of the entrance of the negative pressure room, a hall was used for hand hygiene and the disposal of the infectious equipment. There was a restricted number of staff entering the patient's room and the healthcare team consisted of one doctor and six nurses. However, this was not feasible due to low nurse staffing levels.

As long as the patient remained to the negative pressure room an antibacterial filter was placed in the expiratory part of the ventilator which was replaced every two days. A close circuit system was used in order not to worsen patient's respiratory condition and to avoid as possible the contact of healthcare staff with his respiratory secretions.

The radiographic team responsible for patient's chest X-Rays was consisted of a

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radiologist and a nurse with all appropriate protection measures taken. The radiography board was placed in a bag which was removed after each contact with the patient and then the board was disinfected with special solution for surfaces.

Regarding the laboratory tests transfer, from the 1st until the 12th day a triple protection barrier was followed. Firstly the material for examination was placed to a labeled bag, then the bag to a plastic box and finally to a paper box. From the 13nth until the 24th day a double barrier of protection was used and the paper box was removed.

On the 30th of April, blood and bronchial samples were positive for Acinetobacter baumanii and Klebsiella pneumonie. They were treated with appropriate antibiotics according to their sensitivity.

On the 7th of May 2014 the entire patient's laboratory results (blood, bronchial secretions, urine tests, nasopharyngeal and rectal swabs) were negative for MERS-CoV. On the 12th of May 2014 the negative results were verified for the second time and at the same day the patient was transferred to general Intensive Care Unit. The healthcare staff was checked for the next 14 days for symptoms like fever, cough or diarrhea by the committee of hospital infections. Although the staff was not able to keep the restricted number of doctors and nurses dealt with the patient's treatment, no transmission of the virus occurred, either to the healthcare team or to other ICU patients.

DISCUSSION

In this report the case was hospitalized in ICU, in an isolated negative pressure room until all his laboratory results prove negative. High protection measures were followed in every procedure of the healthcare team. There was no transmission of the virus among the healthcare team (doctors, nurses, radiologists) during patient's isolation or to other patients after his transfer to general ICU. However the patient's tests showed bacteremia which was treated with the proper medications.According to ECDC[8] until the 4th June 2014 were identified 815 cases of MERS-CoV infection, nonetheless the reports about the virus' transmission among the healthcare staff, other patients and close contacts remain inadequate.

Specifically, in a study[9] conducted in a French hospital in April to May of 2013 a person-to-person transmission of MERS-CoV occurred between two patients. Both patients were hospitalized in the same room for three days. The initial case was travelling from Dubai but the secondary case had not recently travelled abroad. The distance between their beds was 1,5m, they shared the bathroom and neither of them wore a protective mask. Despite the fact that the healthcare staff did not take

specific protection measures any subsequent cases were not identified.

On March 2013, in Germany,[10] a patient from United Arab Emirates was transferred in ICU with MERS-CoV infection and was isolated from other patients. The healthcare staff used infection control measures, mostly FFP2 mask. A contact investigation conducted through questionnaires in two groups of close (face-to-face or direct to body fluids) and less close contacts (all other). There were collected information about type of contact, type of protection (FFP2 mask, gloves, and gown), and symptoms experienced (fever, diarrhea, cough, shortness of breath). No secondary cases of MERS-CoV occurred.

On April 2014, in Malaysia[2], the staff of the local hospital dealt with a case of MERS-CoV infection following infection prevention and control procedures according the national guidelines. The contact tracing which conducted showed negative results.

On June 2013, in Italy,[11] there were two secondary cases of MERS–CoV infection which occurred before hospitalization. The patient was isolated and treated in a negative pressure room. The healthcare staff used protective clothing, hand hygiene as protective measures.

Finally a hospital outbreak of MERS-CoV infection occurred in Eastern province of Saudi Arabia in four healthcare facilities with 23 confirmed cases between April 1 and May 23, 2013. Transmission occurred among patients, healthcare workers and patients' families although the infection control measures which included, hand hygiene, putting masks to patients, environmental cleaning, contact precautions and restricted number of visitors and healthcare workers dealing with the patients.[12]

CONCLUSION

Finally we don't have enough evidence to say whether these patients require hospitalization in the negative pressure room to avoid transmission. Therefore, all health care professionals and relatives who come into contact with people infected with the MERS-coV must take strong protective measures.

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ANNEX

Table 1. Clinical characteristics during hospitalization in negative pressure room

	1st-4th Day			5th-24th Day		
	Min	**Max**	**mean±SD***	**Min**	**Max**	**mean±SD***
WBC (10^3/μl)	8230	10600	9535±1151	3620	17700	9482±3887
Ht (%)	37.1	40.0	38±11.3	16.9	33.0	25.3±4.6
Hb (g/dl)	12.0	13.0	12.4±0.4	5.4	11.1	8.3±1.5
PLT (10^3/μl)	239000	392000	313750±66269	68000	329000	216789±86805
CRP (mg/dl)	21.3	21.3	21.3±0	21.3	29.2	24.7±2.5
PCT (ng/mL)	0.10	0.10	0.0950±0	0.39	2.56	1.12±0.97
Glucose (mg/dl)	113	136	122±11	83	182	126±28
Urea (mg/dl)	23	56	34±14.9	79	170	122±24
Creatinine (mg/dl)	0.6	1.1	0.75±0.23	1.1	2.1	1.4±0.24
K^+ (mEq/L)	4.7	5.3	4.9±0.26	3.4	5.4	4.6±0.48
Na^+ (mEq/L)	138	148	143±4	144	158	151±3
Bilirubin (mg/dl)	0.40	0.60	0.5±0.14	1	6.9	2.5±2
SGOT (iu/l)	58	178	102±53	29	118	66±28
SGPT (iu/l)	46	81	60±15	26	85	43±16
ALP (iu/l)	80	86	83±3	63	236	111±52
LDH (iu/l)	447	705	526±120	228	824	477±179
γ-GT (iu/l)	47	57	50±5	27	66	44±11
Ca^{2+} (mg/dl)	6.9	7.4	7±0.2	6.0	7.5	6.8±0.44
PO_4^{2-} (mg/dl)	2.0	3.2	2.6±0.5	2.0	6.2	3.9±1.4
Mg^{2+} (mg/dl)	1.7	2.8	2.1±0.4	1.5	2.9	2.2±0.4
Cl^- (mg/dl)	98	112	107±6	107	120	111±3.2
Troponin (ng/mL)	0.017	0.063	0.03±0.26	0.066	2.080	0.40±0.61
MAP (mmHg)$	64	78	71±6	60	111	78±18
Temperature (°C)$	38.5	40.0	39±0.74	37	40.5	38.5±0.98
SpO_2 (%)$	93	95	93±0.9	88	96	93±2
Heart Rate (/minute)$	50	65	57±6	65	140	105±19

* mean±SD : mean ± Standard Deviation

$ the worst values on day