

Investigation of Cardiopulmonary Complications in Patients with Infection and Prevalence of Intubation in ICU with Radiological Point

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Abstract

In this study, cardiopulmonary complications in patients with infection and the prevalence of intubation in ICU have been investigated. Every year, hundreds of thousands of people around the world suffer from heart attacks. This new research shows that respiratory infections, whether mild or severe, can make some people susceptible to heart attacks. The results of the present study have shown that not only is shortness of breath common in these patients, but it also has a good diagnostic value and has a sensitivity of 83% and a specificity of 54%. This problem shows that the use of shortness of breath symptom is very helpful to identify critically ill patients, especially in emergency department triage. Patients with heart failure referred to the emergency department are triaged in order to identify critically ill patients. Triage decision-making is very important, because accurate triage can reduce mortality, while an error in this decision can seriously endanger the patient's life. How triage scales are able to correctly identify critically ill patients is questionable.

ke words: *Cardiopulmonary Complications, Patients, Mortality, ICU*

Introduction

Every year, hundreds of thousands of people around the world suffer from heart attacks. This new research shows that respiratory infections, whether mild or severe, can make some people susceptible to heart attack. A group of researchers from the University of Sydney in Australia, in a study about the relationship between respiratory infections and the risk of heart attack, 578 examined a patient who had a heart attack due to a blockage in the coronary arteries [1-3]. These patients had reported respiratory infections including bronchitis and pneumonia in their history and provided information about their most recent cases of infections

and the number of times they get an infection. Sore throat, cough, fever, sinus pain, and other flu-like symptoms were among the symptoms that patients were asked about, and the diagnosis of heart attack in these patients was confirmed by coronary angiography; Coronary angiography is a special X-ray test that is used to detect the possibility of blockage of the coronary arteries and the extent of their blockage. The researchers also performed another analysis in a group of patients with upper respiratory tract infections, including colds, sore throats, sinusitis, and rhinitis [4-6].

The new study, published in the Internal Medicine Journal, found that respiratory infections such as pneumonia, the common flu, and bronchitis appear to increase the risk of heart attack. Although the risk of heart attack among patients with mild respiratory infection was lower, it was still 13 times higher than usual [7]. The researchers say, according to these results, the risk of heart attack does not occur only at the beginning of a respiratory infection, but this risk is at its peak in the first seven days and then decreases slightly and remains high continuously for a month. The Covid-19 disease caused by infection with the new SARS virus has quickly become a pandemic and despite many efforts, it is still causing many deaths. Lung is the main organ involved in Covid-19 infection [8-10]. The reason for the high prevalence of lung involvement in patients is the presence of large amounts of angiotensin-converting enzyme 2 (ACE2) in the lung parenchyma, especially in the pneumocytes in the alveoli, which facilitates the entry of the virus [11-13].

However, the corona virus has the ability to cause complications in any body system. Although reverse transcription polymerase chain reaction (RT-PCR) laboratory test is used as the gold standard for diagnosing the disease, various imaging methods such as chest X-ray, CT scan and ultrasound are used for early diagnosis, especially in cases of false negative PCR, as well as follow-up of the treatment process and diagnosis of possible complications are used. Many of the radiological findings of Covid-19 are non-specific and can be seen in a wide range of other lung diseases, but the presence of a significant radiological appearance, especially along with clinical findings or a positive history of contact with an infected person, strongly suggests a viral infection [14-16]. The most common radiological findings reported in corona pulmonary infection include lesions (Ground Glass Opacity; GGO) with or without pulmonary consolidation, preferably involving the sub pleural areas and the base of the lungs.

Other significant radiological findings include crazy paving sign, halo and reticular infiltrates. Although in many patients, the complete recovery of pulmonary findings is seen, however, complications due to Covid-19 are seen in another group of patients, even after

clinical recovery. The new corona virus has the ability to cause complications in any body system [17-19]. Respiratory complications are one of the most well-known manifestations and can affect the course of the disease and prognosis of the patient. Involvement of the cardiovascular system has also been reported in various studies and can manifest as arrhythmia, pericarditis, acute myocarditis, cardiomyopathy, vascular embolism and even shock. There is increasing evidence that coagulation disorders associated with Covid-19 predispose patients to venous and arterial thromboembolism.

In various studies, the presence of venous thrombosis has been reported in 25-49% of patients. Pulmonary CT angiography is a suitable diagnostic method to investigate the possible presence of pulmonary embolism, especially in patients with sudden exacerbation of respiratory symptoms or positive D-dimer marker. The most common cases of thrombosis are in the segmental and lobar branches of the lung, and the presence of thrombosis in the central vessels of the lung is less reported. Many different complications have been reported following the disease of Covid-19 [23]. Nevertheless, pulmonary involvement is still the most important cause of death. Although the disease often improves after going through different clinical phases, short-term or long-term complications are observed in some patients. Persistent fibrotic changes following clinical improvement, bacterial and fungal lung infections, ARDS, pneumomediastinum and pneumothorax, heart injuries in the form of myocardial and pericardial involvement, and pulmonary artery embolism are all important complications reported following infection with the coronavirus [20-22]. Various imaging methods, especially CT scan of the chest, not only play an important role in the initial diagnosis of the disease, but are widely used to follow the treatment process and detect possible secondary complications [23-25]. Therefore, it is necessary to be familiar with the common radiological findings of the disease and also the radiological manifestations of secondary complications in order to perform appropriate treatment measures. Reducing or stopping the process of developing pulmonary complications following Covid-19 infection will be of significant importance in reducing mortality and improving the quality of life of those who have recovered (Figure 1).

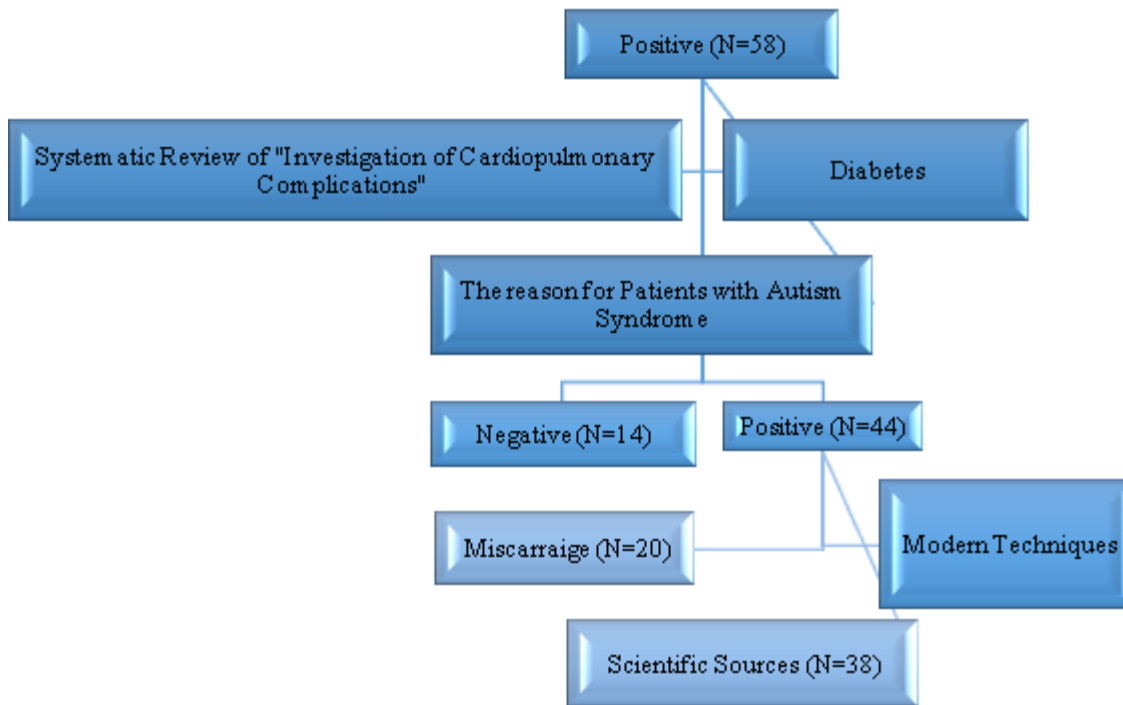


Figure 1. Flow chart of included subjects

Investigation of nosocomial infection

Nosocomial infection is defined as an infection that people admitted to the hospital get during the time they stay in the hospital, and the manifestations of the disease may appear during the hospitalization or after the patient is discharged. Usually, infections that appear after 48 to 72 hours are considered as hospital infections, and if an infection occurs less than 48 hours after the patient's hospitalization, it is likely that the person is in the incubation stage when admitted to the hospital. It causes increased costs - prolonged recovery - disability and death of patients. In the case of patients who get an infection after discharge, these patients are included in the definition of hospital infection when:

- A) 7-10 days after the discharge of the patient who was hospitalized for internal reasons, no special surgery was performed.
- B) Up to one month after discharge due to surgery that the implant has not been applied to the patient, such as: Laparotomy, appendectomy and hernia.
- C) Up to one year after the surgery that the implant has been applied to the patient, such as orthopedic operations that include screws, pins, plates, etc., the work will be over [25].

Infectious diseases are disorders caused by organisms such as bacteria, viruses, fungi, or parasites. Many organisms live in and on our bodies. They are usually harmless or even helpful. But some of them may cause disease under certain conditions. Some infectious

diseases may be transmitted from person to person. Some of them are transmitted by insects or other animals, and others are transmitted by consuming contaminated food or water or exposure to environmental organisms. Signs and symptoms vary depending on the organism causing the infection.

Examination of heart failure and its problems

Heart failure is a chronic and debilitating disease associated with significant morbidity and mortality. The serious complications of the disease and the changing nature of the disease cause these patients to constantly visit medical centers, in which the emergency department plays a major role. Referrals of these people to the emergency department are associated with a wide range of signs and symptoms that appear in the form of increased systolic blood pressure, cardiogenic shock, severe respiratory distress, pulmonary edema, and acute coronary syndrome. These signs and symptoms can help to identify sick patients earlier and start their care and treatment faster, thus reducing the mortality of patients with heart failure. Shortness of breath caused by pulmonary congestion is the most common symptom experienced by about 75% of critically ill patients, which has a significant direct relationship with morbidity and mortality [26-28]. Shortness of breath can appear as shortness of breath at rest, orthopnea, nocturnal attack, and active shortness of breath. Studies have shown that not only is shortness of breath common in these

patients, but it also has a good diagnostic value and has a sensitivity of 83% and a specificity of 54%. This problem shows that the use of shortness of breath symptom is very helpful to identify critically ill patients, especially in emergency department triage.

Patients with heart failure referred to the emergency department are triaged in order to identify critically ill patients. Triage decision-making is very important, because accurate triage can reduce mortality, while an error in this decision can seriously endanger the patient's life. How triage scales are able to correctly identify critically ill patients is questionable [29]. Fazel et al showed that the emergency deterioration profile scale may not be able to identify patients with chest pain complaints optimally, because a limitation that has a significant contribution to this problem is that the emergency deterioration profile scale (ESI) which is non-specialized and general triage criteria for all types of patients, it may not be able to correctly identify subgroups of patients. For example, the criteria of class 2 of this scale include: high risk patient. However, it depends on the triage nurse herself who can mentally find a connection between the patient's conditions with heart failure and high risk. Perhaps this is somewhat expected for experienced nurses, but considering that a small part of emergency department nurses is usually experienced, there is a need for specialized scales for important subgroups of patients [30-32]. On the other hand, observations have shown that the frequent visits of these patients to the emergency department reduces the sensitivity of nurses in providing timely and early care to them, which provides the basis for triage error (light triage). Therefore, these scales can make the safety of caring for these patients more effective. Triage error also leads to inappropriate use of emergency department resources, that is, outpatients may consume more resources and critically ill patients may consume less resources than they need [33].

In this regard, Grossmann et al. reported that there is a significant difference in the resources consumed in the emergency department in patients with different deteriorations based on the triage of the emergency deterioration profile. Considering that triage error has been reported in patients with heart failure, the resources used can indicate the validity of the scale. Van Spall et al showed in a study that 4.1% of patients with heart failure need special attention and program [34]. They showed that 3% of heart failure patients who died were assigned to classes 3, 4, and 5, which is a very threatening triage error. Therefore, it is very important to know whether heart failure patients interact with triage scales like other patients. Paying attention to the above points shows a significant gap in

the rapid identification of patients with critical heart failure in the emergency department, which causes resources not to be used in appropriate cases. This means that these patients, who constitute an important group of patients referred to the emergency department and have a relatively high mortality rate, suffer from a significant triage error. This triage error causes an increase in their morbidity and mortality and causes allocated resources not to be used properly. One of the solutions is to develop a dedicated triage scale for patients with heart failure. The development of the heart failure triage scale can provide a specialized and effective triage of such patients with an evidence-based approach, so that the triage error can be reduced and, as a result, the consumption resources can be properly allocated.

Examination of the cardiovascular symptoms of Corona

Corona is considered a spectrum disease. But what is meant by spectrum disease? Corona includes a wide range of symptoms from very mild shortness of breath to severe lung infection and death. These symptoms vary from person to person. At the beginning of the epidemic, there were reports about the occurrence of problems and cardiovascular symptoms of Corona. A report from the early days of the pandemic described the extent of heart damage among 41 patients hospitalized with Covid-19 in Wuhan, China: Five, or 12 percent, showed signs of cardiovascular damage. In fact, the researchers explain that in most influenza epidemics, more patients die from cardiovascular complications than from pneumonia-influenza causes.

People with poor cardiovascular health seem to experience more severe symptoms of Covid-19. For example, in a study of 44,672 people with coronavirus in China, 4.2% had cardiovascular disease. However, these individuals accounted for 22.7% of all deaths. In a smaller trial involving 100 patients, researchers found that 40 percent of patients had pre-existing vascular problems. You should also know that this disease also affects the severity of death. This means that these people have much more severe symptoms and the risk of death increases significantly. If you experience heart palpitations after contracting the corona virus, you should contact your doctor [35]. A temporary increase in heart rate can be caused by various factors, including dehydration. Make sure you drink enough fluids during this time, especially if you have a fever. Symptoms of a fast or irregular heartbeat can include:

- Feeling of fast or irregular heartbeat in the chest (palpitations);

- Feeling lightheaded or dizzy, especially when standing;
- Chest discomfort.

According to recorded reports, Covid-19 can cause multiple organ damage, including direct and indirect damage to the heart. One of the ways that Covid-19 can affect the heart is by attacking the heart muscle itself, causing inflammation within it and, in severe cases, permanent damage – through muscle scarring or muscle cell death. Inflammation can build up in the heart as a result of a person's immune system overreacting to infection, flooding the body with what is called a "Cytokine storm." Regardless of whether it is caused directly or indirectly during a coronavirus infection, inflammation in the heart muscle is called myocarditis and is a common cause of heart failure. There are several other ways the heart can be affected by Covid-19. For example, if the lungs become inflamed or injured, the right ventricle must work harder to deliver blood to the lungs. This can disrupt the right ventricle and cause right-sided heart failure with fluid backing up into the liver and kidneys. It can also cause swelling and fluid accumulation in the legs and abdomen.

Inflammation caused by corona virus infection is one of the important problems that must be addressed. According to experts, this level of inflammation is caused by a phenomenon called 'cytokine storm. In such a situation, the body's immune system reacts very strongly against the virus. In addition to attacking the virus, the immune system also attacks the healthy cells of the body. In this way, inflammation flares up. The intense inflammatory response puts a lot of pressure on the heart. And when the body is fighting an infection, the heart has to pump blood harder [36]. In such a case, an excessive increase in cytokines will cause inflammation of the heart, dysfunction of heart muscle cells or their death. This leads to dysfunction of the heart and heart failure. According to the research results published in the Cardiovascular Medicine Journal at the end of April, there are several reasons for the effects of lung infection on the heart. Extensive inflammation caused by infection, direct effect of the virus on the cardiovascular system, history of heart disease and stress caused by infection are considered to be the main causes of this disorder.

According to doctors, the occurrence of a severe inflammatory reaction in people infected with the corona virus increases the risk of heart diseases and

death from the virus. Corona virus directly infects the cells of the cardiovascular system. Corona virus infects the body through a receptor called angiotensin-converting enzyme 2. The presence of these receptors in the lung causes respiratory symptoms. But their presence in the heart and blood vessels has also been confirmed [37]. According to the statements of one of the cardiologists, the corona virus enters the heart cells through these receptors and infects them. As soon as the virus enters the heart cells, it directly damages them. In this situation, the strong reaction of the body's immune system will lead to functional defects and cell death. Researchers had observed such a situation during the SARS outbreak. SARS virus was also attached to the mentioned receptors. Sampling of people infected with SARS indicated the presence of genetic material of the virus in their heart tissue.

Investigating the prediction of the outcome of stopping mechanical ventilation in ICU patients

Mechanical ventilation by increasing the inspiratory oxygen concentration, reopening the overlapped alveoli (collapse) and providing adequate alveolar ventilation has beneficial effects on the pathophysiology of acute lung failure, but with complications such as increasing the risk of sinusitis and airway damage, thromboembolism, gastro-intestinal bleeding, pneumonia, dependence on ventilator, pressure trauma to the lung, injury to the lung caused by the ventilator, etc. Therefore, when the need for artificial respiration is removed, it is necessary to think about separating the patient from the ventilator and starting spontaneous breathing as soon as possible. The lack of beds in intensive care units, as well as the lack of mechanical ventilation equipment in hospitals, especially in our country, is always considered as an important and permanent problem in the health system [38-40]. Therefore, while considering the length of hospitalization in special departments and the risks of stopping artificial ventilation, finding ways to shorten hospitalization and the period of dependence on artificial ventilation can help reduce treatment costs and complications of mechanical ventilation [41]. Timely, fast, uncomplicated and successful isolation by shortening the period of mechanical ventilation reduces the complications of ventilation (decreased cardiac output and infections caused by artificial ventilation), hyper and hypoventilation, atelectasis, oxygen poisoning, pressure trauma and psychological dependence on a ventilator. Unnecessary prolongation of mechanical ventilation is associated with increased mortality [42-44]. This is despite the fact that the unsuccessful interruption of ventilator support often

causes fatigue of the respiratory muscles and imposes serious stress on the cardiovascular and respiratory systems.

Deciding to separate the patient from the ventilator based only on clinical criteria is usually not correct and leads to premature and unsuccessful separation. Therefore, in addition to clinical criteria, physiological tests should also be considered [45-47]. These physiological tests are known as predictors of isolation results. One of the reasons for the failure in separation is the existence of many influential factors. Therefore, indicators and criteria that consider a pathophysiological mechanism are not valid and do not have sufficient accuracy. The indicators that consider multiple mechanisms have higher accuracy. There is a great desire to determine specific measurable indicators to predict isolation outcomes, however, a single indicator that is successful in this prediction has not yet been identified [48]. Yang and Tobin introduced compliance index, respiratory rate, oxygenation and pressure. One of the best indicators is rapid and shallow breathing index (RSBI) or the ratio of respiratory rate to tidal volume (RR/TV), which was introduced by Yang et al. in 1991 with a positive predictive value of 85% [49].

Lung atelectasis is common in patients under mechanical ventilation, which has different causes. If atelectasis is caused by endo bronchial obstruction, it can be removed by bronchoscopy, otherwise, bronchoscopy will not help the treatment. As in the case of this study, 6 times of bronchoscopy did not help the patient's treatment process. A delay in removing atelectasis can lead to the addition of infection on atelectasis areas [50-52]. The atelectasis areas of the lung are a favorable environment for the development of pneumonia, which occurs as ventilator-dependent pneumonia in the ICU, this infection causes the length of stay in the ICU and increases the treatment costs, and has a high mortality rate. Therefore, detecting and quickly fixing atelectasis areas can be effective in preventing the spread of VAP [53].

In a study on an obese patient with lower limb muscle weakness who was under mechanical ventilation in the ICU due to respiratory failure, airway pressure release ventilation (APRV) was used to treat lobar atelectasis. In the case of the patient examined in this study, a single-lumen tracheal tube was first used, and a ventilator was used to ventilate both lungs, but no change in lung compliance was achieved by changing peep [54-56]. Also, despite several times of bronchoscopy, the lung condition was not improved

and the patient's clinical condition did not improve. Due to the fact that the volume and pressure on the lungs is diverted towards the healthy lung and the collapsed lung does not accept the volume and pressure. Therefore, the decision was made to convert the patient's tube into a left-rounded double-lumen tube so that two lungs can be mechanically ventilated with two separate patterns [57-59]. As mentioned in the references, one of the absolute indications of separating the two lungs for ventilation is one-sided lung problems that prevent ventilation of the opposite lung. After separating the two lungs, a better access to the left lung was achieved with a bronchoscope, and this lung was emptied of mucous plaques as much as possible. In the conditions of using two separate ventilators, it was possible to distribute Peep properly for ventilation of two lungs, and by measuring the compliance of both lungs separately, the left lung was gradually expanded, and therapeutic interventions became effective, and the clinical conditions of the patient improved.

Lungs are the place of air storage for the breathing of life organs. Before I see what harms this vital organ. We have to take a closer look at this sensitive part of the body and its uses. The trachea has two branches, right and left, which are called bronchi. The right bronchus is slightly larger than the left bronchus and the right bronchus enters the right lung and the left bronchus enters the left lung. The cilia in the lungs end in small air cavities called alveoli. Lungs, which are considered as purifying organs, are like a spongy tissue. When we take air into the body through inhalation [20]. Air enters the larynx and then the trachea. Then it reaches the left and right bronchi to be directed into the lungs. The bronchioles, which are located between the trachea and the air sac, end in small microscopic air sacs or cavities that absorb oxygen from the air and transfer it to the bloodstream, and in return, take the waste carbon dioxide from the blood and take it to the lungs are transferred to be removed from the body through excretion. The health of people's respiratory system is affected by many factors, including air pollution. When air pollution is high, the risk of lung diseases and lung infections also increases. One of the most common types of lung infection caused by viruses, bacteria and sometimes fungi is pneumonia, which can threaten people's lives and health. Here are the warning signs of lung infection:

Persistent cough

People with lung infections cough constantly. Respiratory diseases such as bronchitis or pneumonia usually cause a cough that is accompanied by thick white, green, and yellowish-gray mucus. Sometimes there may be some blood in the mucus. This type of cough may last for several weeks.

Shortness of breath and chest pain

Shortness of breath means that a person cannot breathe easily and faces breathing problems. In addition to being one of the symptoms of lung infection, shortness of breath may also be a sign of other dangerous diseases such as heart attack; For this reason, it is very important to diagnose the cause of shortness of breath. Shortness of breath caused by a lung infection may also be accompanied by other symptoms such as chest pain. When people get a lung infection, the airway narrows due to inflammation. Therefore, the person suffers from wheezing.

Fever, chills, fatigue

Any type of infection may cause serious inflammation in people's bodies and endanger their health, lung infection is no exception to this rule. Lung infection may be accompanied by symptoms such as fever, chills and fatigue; The occurrence of these symptoms indicates that the body is fighting the infection.

Treatment of lung infection

Doctors may prescribe antibiotics to treat bacterial lung infections, and fungal lung infections are treated with antifungal medications. It seems that the use of these types of drugs does not help to treat the viral lung infection, and the body must fight the infection on its own. Although most lung infections are treated with medication, home remedies can help speed recovery and reduce associated symptoms. It is recommended that people drink plenty of fluids, get enough rest, follow a healthy diet, and avoid smoking. Quit smoking, use a humidifier to keep the environment humid, don't be exposed to cigarette smoke, and put your head higher than your body when sleeping so that mucus doesn't block the airway.

Epidemiological study of infectious diseases in the elderly

Aging is a natural process and the last stage of human growth and development. Like other stages of development, changes occur in the physiological, psychological and social dimensions of people. This complex process occurs in all living organisms and has

unique characteristics in humans of this sensitive period. Today, with the increase in life expectancy, the elderly are the fastest growing population groups in the world. About 10% of the world's population is made up of the elderly (people over 65 years old), and in some societies this number reaches 30%. In 2000, 10% of the world's population was elderly, and this will increase to 22% in 2050. Currently, 8.5% of the total population of Iran is elderly, which will reach 26% or 26 million people in 2050. According to the definition of the World Health Organization, old age means age above 65 years. People at this age are prone to various infections for various reasons [11].

The increased risk of infection during this period is probably due to the physiological changes that are the result of the aging process. Impairment in cellular and humoral immune function, nutritional deficiencies, bacterial colonization in some mucosal surfaces, reduction of the body's physiological defensive reflexes such as cough, wound healing, and increase in the prevalence of chronic diseases with infections are among the possible causes of the increase in the incidence of infectious diseases in old age. Also, the poor control of the use of antibiotics leads to the development of resistance to microorganisms, which is one of the causes of the increase in infectious diseases in the elderly, especially in developing countries. Diagnosis and treatment of infection in the elderly is difficult, because elderly patients often lack classic signs and symptoms of infection such as fever and leukocytosis, and in case of infection, unusual symptoms such as loss of appetite, nausea and vomiting, and changes in consciousness are observed.

It is also difficult to interpret physical and laboratory findings in these patients; Because most of them have underlying lung and urinary system disorders and on the other hand drug toxicity makes the treatment more difficult in these patients. According to the surveys, 15% of the clients to specialist doctors' offices, 34% of the outpatient treatments in hospitals and 89% of the beds in the care centers are occupied by people over 65 years old. In general, 29% of the cost of medical care is consumed by the elderly. On the other hand, infections still account for 30% of deaths in this age group.

Hogan et al., in a study that aimed to determine the number, distribution, and characteristics of geriatric emergencies in the United States in 2013, acknowledged that knowing the elderly or, in other words, more information related to the elderly will lead to better care of the elderly. Mortazavi et al., in an article entitled "Investigation of nurses' attitudes

towards elderly people and the phenomenon of old age", emphasize that it is necessary to provide specialized training during the education of nursing students as well as in-service courses for working nurses in order to improve knowledge and change attitudes. Then he took an effective step. Considering the increasing number of elderly people in the society and the need to maintain and improve their health, it seems necessary to train skilled and experienced people who are able to communicate with elderly people and can diagnose and take care of their health problems in time. As a result, knowing the current situation can be very helpful for making decisions in any aspect of improving the condition of the elderly. In relation to infectious diseases, it can be said that infections are more common in the elderly, which leads to long-term hospitalizations.

In Ahmadi and Heravi's studies, the most common underlying diseases in hospitalized elderly were hypertension, diabetes and heart disease. In terms of clinical symptoms, the most common symptoms in hospitalized elderly patients were respiratory symptoms in the form of shortness of breath and sputum, followed by systemic symptoms of fever and chills and digestive symptoms. In terms of the system involved at the time of discharge and final diagnosis, pneumonia was 4.52%, urinary infection 15%, septicemia 2.13%, influenza 7.9%, gastroenteritis 9.7%, and other infections were 3.1%. In a study conducted by NASA in 2012, out of 410 elderly people with an average age of 71.69, 17% of elderly patients were hospitalized and 33% of elderly people kept in institutions had bedsores. In Jing et al.'s study in 2016 on 33,656 elderly people, which included 5.37% of all hospitalizations, the most common cause of hospitalization was respiratory and heart disease, and the most common cause of death was also respiratory diseases [4].

In Bonnet's study in 2007 on 1012 elderly with an average age of 1.70 ± 2.8 , 9.43% of the elderly were hospitalized due to infectious diseases, among which pulmonary infections were the most common infections. In a study conducted by Ahmadi in 2013, the infection in people over 65 years old was twice as high as in people under 25 years old ($P < 0.01$). Urinary tract infection in old age and pneumonia in young age were the most common causes of hospitalization. In Heravi's study in 2011 on 248 elderly people, the most common diseases diagnosed were pneumonia (3.33%), septicemia (7.15%), gastroenteritis (9.10%) and urinary infection (6.6%). In the ability study, pneumonia was 43% and urinary tract infection was 11%. In our study,

which was in line with the majority of studies, respiratory infection was one of the most common causes of hospitalization of the elderly in infectious departments. Pneumonia usually accounts for 20-25% of infections in the elderly and five times as often as in the young. Risk factors for pulmonary infection in the elderly are inactivity and accumulation of pulmonary secretions, dementia or Alzheimer's disease, which causes a decrease in consciousness and aspiration. On the other hand, the initial symptom of some infections, such as urinary and digestive infections, in the elderly is only a disturbance of consciousness, and this ultimately causes pneumonia. Urinary tract infection, which was the second most common infection in our study and the most common in some studies, is also of particular importance. Urinary tract infections are one of the most common infections in the elderly. More than 10% of women over the age of 65 have at least one UTI, which increases to 30% in women over 85. Bacteriuria is 10% in elderly men and 20% in elderly women, which, of course, does not require treatment, but if it becomes symptomatic, it requires appropriate antibiotic treatment. Urinary incontinence, recto cystocele, changes in the natural environment of the vagina in elderly women and prostate enlargement in elderly men may be associated with diseases such as diabetes and cause an increase in urinary infections in this group. The most common organism isolated from patients' blood cultures was *Staphylococcus aureus* (42%) and *Escherichia coli* (78%) from urine cultures, followed by *Pseudomonas* (31%). In a study by Slinger in 2011 on 135 elderly people, *Escherichia coli* was involved in 75% of urinary infections and staph in 9.18% of lung infections. In a study by Tavanaei et al. on 272 elderly people hospitalized in Mashhad University Hospitals, 6% had positive blood cultures, two of which were E-coli, two of *Staphylococcus aureus*, and two of *Klebsiella*. In terms of mortality, mortality in the elderly admitted to the infectious department in our study was 12%, which accounted for 37.79% of all deaths [55].

In Jing et al.'s study on the elderly, it was seen that the most important fatal diseases in the elderly were lung cancer, lung infection, stroke, and heart attack. The mortality rate in 6 years was 35.2% in all people and 87.4% in the elderly; In fact, the death of the elderly accounted for 37.97% of all deaths. In a study on 111 elderly people in Ahvaz in 2013, the mortality rate was 7% in the elderly and 3% in the non-elderly, and the difference was significant ($P = 0.042$). Infection in the elderly is associated with serious complications such as pneumonia, urinary tract infection, perforation, abscess

and pressure ulcers. Because of these severe and common complications, the death rate from infections is higher in the elderly than in the young.

Also, in the elderly, the response to fever is often weak even in the presence of bacteremia, and leukostosis and the increase of acute phase proteins may not be present; Therefore, diagnosis of infection and complications is delayed. Malnutrition in developing countries is one of the causes of increasing susceptibility of the elderly to infectious diseases due to its effect on weakening immunity. In this study, a significant relationship was found between respiratory and urinary infection with mortality and with age ($P<0.01$); Pneumonia was 65% and 45% in age above 80 and below 80, respectively, which is a significant difference. ($P<0.01$) Also, office infections in people over 80 years old were twice as many as under 75 years old. In Heravi's study, 98% of hospitalized elderly patients recovered completely and 2% died. In another study, 7.84% of recovery and 11% of deaths were seen, and the mortality rate had a significant relationship with age ($P=0.04$). In the study of 273 elderly people, 5.19 percent of mortality was seen, and the level of consciousness disorder and pneumonia had a significant relationship with mortality. In the Solis study, respiratory infections in people over 85 years old were twice as many as under 75 years old, and this difference was significant. In Virgidis's study, respiratory infections were more common in people over 80 years old, but the difference was not significant. In the studies of Salbia and Domer, a significant relationship was seen between the age of elderly patients and the outcome.

Background research

Dilil et al. (2011) conducted a study titled "Preliminary evaluation of a new index to predict the outcome of spontaneous breathing exercise". In this study, which was conducted on 47 patients recovered from respiratory failure with different causes, CROP, CROE and RSBI indices were studied. RSBI index had the lowest sensitivity (0.89) and specificity (0.65) among other indices. The results of this study are consistent with the present study in that it showed that the RSBI index is not a suitable index for correctly predicting the result of isolation and its use with high false positive cases [56].

In Barbosa et al.'s (2015) study entitled "Using predictors of ventilator isolation after elective heart surgery" indicators of RSBI, IWI, static compliance,

respiratory rate and tidal volume were studied. This study was conducted on 100 patients who underwent heart surgery. The results of this study showed that the RSBI index has the highest sensitivity (99%) and positive predictive value (100%) among all indices and it has been introduced as the best index, which is not consistent with the results of the present study. Of course, in this study, according to the type of selected patients, the comparison of isolation indicators and even their use is questionable. Patients who undergo heart surgery are ventilated not because of respiratory failure, but only because of the surgery and for a short period of time (less than 24 hours), so usually it is not challenging to separate them from the ventilator. In the results of this study, no case of isolation failure was reported, and all patients who entered the study were successfully separated from the ventilator, which confirms this claim [57].

In the study by Dr. Barari Savadkahi and colleagues (2003-2005) in Amirkalai Hospital of Babol, which was conducted with the aim of determining the epidemiological, clinical and paraclinical indicators and underlying diseases of children hospitalized due to pneumonia, 404 patients diagnosed with pneumonia were examined. In this study, patients with fever ($T\geq 39$) and general malaise, respiratory distress, leukocytosis + high poly morphonuclear polymorphonuclear, CRP ≥ 10 mg/dl, ESR ≤ 30 mm/h, infiltration with specific boundaries, involvement of one lung lobe, were taken. Along with pleurisy in lung radiography or with a positive culture for bacteria, bacterial pneumonia and patients who did not have the above conditions were considered, provided that other causes of viral pneumonia were ruled out. In this study, according to the diagnostic criteria, in 86 cases (21%) the possibility of bacterial pneumonia and in 326 cases (79%) the possibility of non-bacterial pneumonia was presented. Among 431 episodes of pneumonia, there were 15 cases (3.5%) of positive blood or pleural cultures, in 7 cases (1.6%) Haemophilus influenza b, 5 cases (1.2%) Streptococcus pneumonia, 2 cases (0.4%) Staphylococcus aureus and 1 case (0.2%) Pseudomonas aeruginosa grew [58].

In a study in Shahrekord (2005) on patients with chronic obstructive pulmonary disease with the aim of investigating antibiotic resistance among bacterial pathogens obtained from patients with upper and lower respiratory symptoms using the protected brushing method, 60% of the sample had a negative culture for bacterial agents and the authors of the article concluded that the main cause of these cases is infection, viral agents and future pathogens. The bacterial pathogens

found in this study were *Streptococcus pneumoniae*, Hemophilic influenza and *Moraxella catarrhalis*. However, the frequency of each of these pathogens is not mentioned in this study [59].

Alavi et al. (2009-2010) investigated the clinical, laboratory, radiological features, the spectrum of pathogenic factors, and the outcome of the disease in 264 patients with community-acquired pneumonia, including 42 patients with diabetes. Based on the results of this study, major pathogens such as *Streptococcus pneumoniae* and *Klebsiella pneumoniae* were isolated in diabetic patients with a significant difference more than other patients [60-70].

In the studies conducted by Dr. Nourbakhsh et al. (2008) and the study by Barati et al. (2009), only the frequency of pneumococcal pneumonia was investigated using the pneumococcal urinary antigen test using the Binax now commercial kit and blood culture. The results obtained were 31.5% and 11.6%, respectively.

Conclusion

Although the complete and exact pathogenesis of this phenomenon is not yet known, thrombotic complications are among the causes of bad prognosis and are associated with high mortality. Pulmonary venous embolism is common in people with severe diseases. This risk is especially high when the disease is caused by the corona virus. Molecular changes caused by Covid-19 are similar to the changes seen in pulmonary vascular diseases and can lead to vascular endothelial dysfunction, increase the risk of coagulation in the lung and cause micro thrombosis. Problems in lung hemodynamics. On the other hand, secondary pulmonary embolism is another known vascular complication due to the increased risk of coagulation and the possibility of clot formation in peripheral veins. Pulmonary venous embolism has been reported in many studies in the context of Covid-19, which is mainly secondary to increased thrombosis in peripheral veins.

Infections increase during old age. Also, the incidence of disability and death due to infectious diseases is high. The clinical symptoms of infections are also different in the elderly compared to young people, which can lead to a delay in diagnosis. Pneumonia, or respiratory problems, is the most common infectious disease in the elderly, accounting for 20-25% of infections, followed by blood infection with 15%. The risk factors of pulmonary infection in the elderly are

inactivity and accumulation of pulmonary secretions, dementia or Alzheimer's disease, which causes a decrease in the level of consciousness and aspiration. The symptom of pulmonary infection in the elderly, unlike the young, which is in the form of fever, chills, cough, and shortness of breath, can only be reduced by reducing level of consciousness. The causes of the relationship between increasing age and the decrease in fever response can be caused by disturbances in the perception and feeling of temperature, quantitative and qualitative disorders in internal febrifuges such as interleukin, and a decrease in the sensitivity of the hypothalamus to internal febrifuges, and defects in the production and maintenance of sufficient body heat. The most common early manifestations of pneumonia, urinary tract infection, and bed sores can be impaired consciousness and confusion, lethargy, loss of appetite, and lack of health. Urinary tract infections are also one of the most common infections in the elderly and are usually second to respiratory infections. More than 10% of women over the age of 65 have at least one office infection per year, which increases to 30% in women over the age of 85. According to the results of Jing et al.'s study in 2013, during the years 2006 to 2011, all elderly patients over 60 years' old who were hospitalized were 33,656 people, which included 5.37% of all hospitalizations. The most common cause of hospitalization were respiratory and heart diseases. The most common cause of death in the elderly, which accounted for 79.37 of all deaths, was respiratory. 51% of the deaths were men and the rest were women. Important fatal diseases in the elderly include lung cancer, lung infection, stroke and heart attack. The mortality rate in 6 years was 35.2% in all people and 87.4% in the elderly. In fact, the death of the elderly accounts for 37.97% of all deaths.

In the study of 1000 elderly by Milit in 2013, which included 612 men (5.65%) with an average age of 1.70 ± 2.8 , 9.43% of the elderly had infectious diseases, and most included lung infections; Therefore, considering the importance of old age and the importance of knowing the current situation of the elderly for the implementation of health care and education, and considering that this study had not been done in Birjand. The most common underlying disease in hospitalized elderly patients was blood pressure (1.36%), followed by diabetes and heart and lung diseases. A study by Peyman et al. in 1990 on 121 elderly people in Ilam showed that cardiovascular diseases with 53%, blood pressure with 8.36% and diabetes with 4.17% were the most common underlying diseases. In Falsi's study in 1995 on 1012

elderly people who were selected by cluster sampling, 1.36% had heart disease, 8.14% had diabetes, and 5.23% had respiratory disease.

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