

Modified Delphi analysis of the guidelines of the All-Russian public organization "Federation of Anesthesiologists and Reanimatologists" "The use of non-invasive lung ventilation"

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Abstract

INTRODUCTION: The need for an independent assessment of the guidelines before their planned revision based on the third-party opinion of competent specialists is beyond doubt. This analysis allows to adapt the implementation of recommendations in practice, regarding equipment and knowledge of physicians. **OBJECTIVE:** To analyze the effectiveness, safety and availability of implementation in clinical practice of the guidelines "Application of non-invasive lung ventilation" using the modified Delphi method. **MATERIALS AND METHODS:** The expertise consisted of three stages. The first stage consisted in the analysis of the guidelines "The use of non-invasive lung ventilation" and the preparation of a questionnaire. At the main stage, a questionnaire was sent out and panel members were asked to evaluate the positions using ten-point Likert scale. The analytical stage consisted in calculating the weighted average, median and mode. The weighted average score were taken into account; the value of the median or mode of criteria for the quality of medical care, weighted average. **RESULTS:** Fifteen panel members was enrolled. The main remarks and additions were to clarify the terminology, concretize certain recommendations and style. Panel members determined the possibility of implementing the recommendation of the guidelines in practice. The lack of equipment makes therapeutic measures limited. This fact confirms the low results of the weighted average assessment of the criteria for the quality of medical care. **CONCLUSIONS:** Consensus was reached on 20 of the 21 thesis recommendations, on four of the eight criteria for the quality of medical care, and on the amended wording of certain recommendations. The Delphi analysis made it possible to look at the implementation of the guidelines from the perspective of practicing anesthesiologist and intensive care physician, including in structural units with a low level of material and equipment.

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Реферат

АКТУАЛЬНОСТЬ: Необходимость независимой оценки рекомендаций перед их плановым пересмотром на основе стороннего мнения компетентных специалистов не вызывает сомнений. Данный анализ позволяет адаптировать реализацию рекомендаций на рабочих местах с учетом особенностей оснащения и знаний специалистов. **ЦЕЛЬ ИССЛЕДОВАНИЯ:** Провести анализ эффективности, безопасности и доступности выполнения в клинической практике методических рекомендаций «Применение неинвазивной вентиляции легких» с помощью модифицированного метода Дельфи. **МАТЕРИАЛЫ И МЕТОДЫ:** Экспертная оценка была проведена по инициативе комитета по рекомендациям и организации исследований Общероссийской общественной организации «Федерация анестезиологов и реаниматологов» и состояла из трех этапов. Подготовительный этап заключался в анализе координатором экспертизы методической рекомендации «Применение неинвазивной вентиляции легких» и оформлении анкеты-опросника, состоящей из трех разделов: оценка тезис-рекомендаций; оценка критериев качества медицинской помощи и общая оценка методической рекомендации. На основном этапе разослана анкета, и респондентам предложено оценить положения по десятибалльной шкале Р. Лайкерта. Аналитический этап заключался в расчете средневзвешенной оценки, медианы и моды. При оценке положений и критериев качества оказания медицинской помощи учитывались значение медианы или моды любого положения, средневзвешенная оценка; значение медианы или моды критериев качества оказания медицинской помощи, средневзвешенная оценка. **РЕЗУЛЬТАТЫ:** В экспертизе приняли участие 15 специалистов. Основные замечания и дополнения заключались в уточнении терминологии, конкретизации отдельных положений и стилистики. Участники дельфийского анализа определили возможность реализации в клинической практике положений методической рекомендации. Дефицит оборудования делает ограниченно выполнимыми лечебные мероприятия. Этот факт подтверждает низкие результаты средневзвешенной оценки критериев качества оказания медицинской помощи. **ВЫВОДЫ:** Достигнут консенсус по 20 из 21 тезис-рекомендации, по 4 из 8 критериев качества оказания медицинской помощи и измененным формулировкам отдельных положений. Дельфийский анализ позволил посмотреть на реализа-

KEYWORDS: Delphi method, clinical guideline, expertise, non-invasive ventilation

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цию методической рекомендации с позиции практикующих врачей — анестезиологов-реаниматологов, в том числе в структурных подразделениях с низким уровнем материально-технической оснащённости.

КЛЮЧЕВЫЕ СЛОВА: метод Дельфи, методические рекомендации, экспертиза, неинвазивная вентиляция легких

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Introduction

The necessity of an independent evaluation of the recommendations before their planned revision with the third-party opinion of competent specialists is obvious. This analysis allows to adapt the realization of recommendations in practice considering the equipment and specialists' level.

Currently, there are several methods to assess the possibility, feasibility and effectiveness of decision-making in various clinical situations. The most suitable method is the Delphi method which allows to get a consistent general opinion based on individual assessments of experts after generalizing and processing the data. The advantages of the method are the formation of an independent opinion

on the issues discussed by each member of the group followed by the output of a collegial opinion [1–3].

The method of the Delphi assessment has the main characteristics: phasing, anonymity of participants, absentee discussion, standardization of the survey for all participants, validity of third-party opinion, final interpretation based on the opinion of all experts, statistical aggregation of group responses and expert contribution [4].

The Delphi method is used in the field of technology and science forecasting; however, it has not yet used widely in the Russian scientific literature.

Purpose of the study

To analyze the efficacy, safety and accessibility of the clinical implementation of the methodological recommendation “The use of non-invasive ventilation” using the modified Delphi method.

Materials and methods

The second revision of the guidelines “The use of non-invasive ventilation” was published in 2019 [5]. Later during the interaction of the authors with the Center for Expertise and Quality Control of Medical Care of the Ministry of Health of Russia and placing the guidelines in the clinical recommendations rubricator, some additions were made to the text [6]; it was this version that underwent the Delphi assessment by the initiative of the Committee on Recommendations and Organization of Research of the All-Russian Public Organization “Federation of Anesthesiologists and Resuscitators” (FAR) and consisted of several stages:

The preparatory stage was the coordinators analysis of the Delphi evaluation of the methodological recommendation “The use of non-invasive ventilation” of 2020 [6] and the design of a questionnaire consisting of three sections: the evaluation of the methodological recommendation; the assessment of the quality criteria of medical care and the overall assessment of the methodological recommendation. The questions and criteria of the analysis were developed accordingly to the recommendations for the modified Delphi method use in clinical and pharmacokinetic studies [7]. A group of independent specialists in the field of respiratory support has been formed representing high educational institutions, leading federal and regional medical organizations.

To evaluate each statement of the methodological recommendation “The use of non-invasive ventilation” the designated specialists had to answer five questions:

1. The thesis-recommendation contains specific understandable to anesthesiologists-resuscitators descriptions of what tactics, in what situation and which patients should be used?
2. As an expert, do you understand how to evaluate the actions of an anesthesiologist-resuscitator?
3. Can the thesis-recommendation be used in the structural units of the profile of anesthesiology-resuscitation?
4. Is this thesis-recommendation useful for the providing the anesthesiology and resuscitation care?
5. Will this thesis-recommendation be followed by anesthesiologists-resuscitators?

The quality criteria of the medical care suggested by the methodological recommendation were proposed for evaluation by experts on six issues:

1. The quality criterion contains specific descriptions understandable to anesthesiologists-resuscitators of what tactics, in what situation and which patients should be used?
2. As an expert, do you understand how to evaluate the actions of an anesthesiologist-resuscitator?
3. Can this quality criterion of the medical care be introduced into the structural units of the profile of anesthesiology-resuscitation?
4. Is this quality criterion useful for the providing of medical care in the field of anesthesiology-resuscitation?
5. Will this quality criterion be followed by anesthesiologists-resuscitators?
6. Is the quality criterion applicable in any medical organization that provides medical care to the adult population in the profile of “anesthesiology-resuscitation”?

The main stage. At this stage, a questionnaire was sent from an impersonal mailbox via the Internet. Respondents were asked to rate each question on a ten-point R.Likert scale from 1 to 10 depending on the expression by the respondents of their agreement (10 points — completely agree) or disagreement (1 point — absolutely disagree) with the theses proposed in the methodological recommendation. Based on the answers and additional information provided by the experts, a questionnaire of the second round was formed and also sent out.

Analytic stage. An assessment of the statements of the thesis-recommendations and quality criteria of medical care was done in the first round of discussions. Based on the results of the second round the final proposals were formed for the co-authors of the methodological recommendation. To select relevant answers the consistency of the scores of each answer with the final score was analyzed.

Statistical analysis

Aggregation was performed using Microsoft Office Excel, 2016. The weighted average score was calculated based on the respondents' self-esteem using the formula:

$$\frac{(K_1 \times O_1 + K_2 \times O_2 + \dots + K_9 \times O_9)}{(K_1 + K_2 + \dots + K_9) \times 10} = \dots \%$$

where K is the self-esteem coefficient, O is the expert assessment.

If in assessing the statements and criteria for the quality of medical care the values of the median or mode of any position were less than 7, the weighted average score was less than 70 %; the values of the median or mode of the quality criteria of medical care are less than 7.5, the weighted average score is less than 75 %, then these statements (quality criteria) should be recommended for processing [1].

Results

The Delphi analysis involved 15 out of 19 specialists who were invited to participate in the survey. The main remarks and additions were in terminology, concretization of individual statements and stylistics. According to the results of the first round (Annex) of the discussion, only one recommendation did not receive 70% of the weighted average rating (question 5 — Will this thesis-recommendation be followed by anesthesiologists-resuscitators? — 67.7%) (Recommendation 19. In patients with high-flow oxygenation it is recommended to use the following tuning algorithm to increase its efficiency).

More discussion was found in the formulation of the thesis-recommendations and the specifics of the data presented. For example, when discussing the recommendation 1 when specifying the indications for non-invasive mechanical ventilation in acute respiratory failure, most experts considered it appropriate to replace the wording "with a moderate PEEP / CPAP" (positive end-expiratory pressure / constant positive airway pressure) with specific values of airway pressure.

Recommendations 1, 3, 8, 10 and 16 provide the information on the characteristics of respiratory support in immunosuppressed patients but do not specify the criteria by which this condition should be stratified, which is important in identifying this category of patients.

Recommendation 4 lacks the criteria for compensated acute respiratory failure (ARF), which should consider non-invasive mechanical ventilation instead of oxygen therapy to improve gas exchange, reduce respiratory performance and improve the prognosis. An important issue, according to experts, is the addition of information on respiratory support in patients with the new coronavirus infection COVID-19 (CORonaVirus Disease 2019) in the discussed guidelines and the revision of the indications for high-flow oxygen therapy with an initial oxygenation index of more than 150 mm Hg specified in recommendation 8.

Most experts supported supplementing the paragraph 5 of recommendation 12 with the Richmond Agitation-Sedation Scale (RASS) which suggests the refrain from non-invasive ventilation.

The experts' assessment of the quality criteria of medical care was focused on the possibility of fully implementing the statements of the methodological recommendation in real clinical practice and mainly affected the equipment of medical organizations and structural units in the field of anesthesiology and resuscitation. The shortage of blood gas and acid-base analyzers, devices for non-invasive mechanical ventilation, including high-flow oxygen therapy, in the departments makes therapeutic measures limitedly feasible. This fact is confirmed by low results (less than 75%) of the weighted average assessment based on the results of the first round of the question "Is the quality criterion applicable in any medical organization providing medical care to the adult population

in the profile of anesthesiology-resuscitation?", related to the implementation of the quality criteria 1 (73.8%), 2 (72.6%), 6 (65.5%) and 7 (73.9%) and (Table 1) the quality criterion 7 "High-flow oxygen therapy initiated in hypoxemic acute respiratory failure in immunocompromised patients" is also not agreed upon in the discussion in the first round. This criterion received a weighted average score of 74.0% on the fifth question on the understanding of the quality criterion by anesthesiologists-resuscitators due to the fact that there is no information in the recommendations about the criteria for immunocompromised patients.

An analysis of the results of the overall estimation of the methodological recommendation showed that less than 70% of positive answers were to two questions (Table 2):

- "The recommendations are unambiguous for understanding, contain specific descriptions of what tactics, in what situation and which patients should be used, according to the totality of the available evidence?" — 68.7%;
- "Do you agree with the use of all the quality criteria of medical care specified in the clinical (methodological) recommendation?" — 43.6%.

It is fundamental to note that the comments and suggestions formulated by the participants of the Delphi assessment can also be useful for the clinical recommendations of the FAR "Diagnosis and Intensive Therapy of Acute Respiratory Distress Syndrome" [8].

Conclusion

There is no doubt about the need for an independent Delphi assessment of methodological recommendations before a planned revision based on the third-party opinion of competent specialists. Consensus was reached on 20 of the 21 thesis recommendations, on four of the eight criteria for the quality of medical care and the re-writing of individual recommendations. The expertise made it possible to look at the implementation of the methodological recommendation from the perspective of practicing anesthesiologists-resuscitators including number in structural units with a low level of material and technical equipment.

Appendix Information

The article contains an electronic appendix, available at the following link:

<https://doi.org/10.21320/1818-474X-2023-4-XX-XX>

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Table 1. The quality care statements proposed to be changed

Quality criterion	Formulation of the quality criterion of the methodological recommendation	Question* / Weighted average score (%) based on the first-round results	Recommendation /proposed reformulation resulting on the second-round results
1	Non-invasive mechanical ventilation in exacerbation of chronic obstructive pulmonary disease was initiated in moderate respiratory acidosis ($7.35 > \text{pH} > 7.25$) and compensated acute respiratory failure	1/93.2 2/97.0 3/89.9 4/94.3 5/84.4 6/73.8	Supplement the signs of compensated ARF
2	Non-invasive mechanical ventilation initiated in community-acquired pneumonia in patients with chronic obstructive pulmonary disease	1/79.2 2/85.5 3/78.3 4/77.9 5/77.5 6/72.5	Remove the criterion
3	Non-invasive mechanical ventilation started in cardiogenic pulmonary edema	1/96.6 2/94.5 3/92.2 4/96.8 5/90.8 6/84.5	
4	Non-invasive mechanical ventilation is initiated after tracheal extubation in patients with hypercapnia due to obesity or chronic obstructive pulmonary disease	1/93.8 2/91.6 3/89.9 4/94.0 5/86.0 6/81.8	Edit / Non-invasive mechanical ventilation started after tracheal extubation in patients at high risk of developing postoperative respiratory failure (hypercapnia due to obesity or chronic obstructive pulmonary disease)
5	Non-invasive mechanical ventilation initiated in hypoventilation syndrome in obesity	1/93.0 2/90.8 3/90.8 4/94.3 5/85.7 6/79.4	
6	High-flow oxygen therapy has been initiated in patients with hypoxemic acute respiratory failure due to community-acquired pneumonia	1/88.8 2/86.4 3/77.7 4/88.3 5/81.4 6/65.5	Remove the criterion
7	High-flow oxygen therapy initiated in hypoxemic acute respiratory failure in immunocompromised patients	1/83.7 2/83.5 3/83.0 4/87.3 5/74.0 6/73.5	Edit / High-flow oxygen therapy initiated in hypoxemic acute respiratory failure in immunocompromised patients (oncohematological, Pneumocystis pneumonia, after organ transplantation)

End of table 1

Quality criterion	Formulation of the quality criterion of the methodological recommendation	Question* / Weighted average score (%) based on the first-round results	Recommendation /proposed reformulation resulting on the second-round results
8	During non-invasive mechanical ventilation the vital functions (central nervous system, respiration and blood circulation) were monitored and the effectiveness of non-invasive mechanical ventilation was evaluated	1/88.1	It is necessary to specify the criteria for the effectiveness of NIV
		2/88.0	
		3/88.0	
		4/91.0	
		5/89.9	
		6/87.6	
* Note: Questions on assessing the criteria for the quality of medical care:			
1. The quality criterion contains specific descriptions that are understandable to anesthesiologists-resuscitators of what tactics, in what situation and which patients should be used?			
2. As an expert, do you understand how to evaluate the actions of an anesthesiologist-resuscitator?			
3. Can the criterion of the quality of medical care be introduced into the structural units of the profile of anesthesiology-resuscitation?			
4. Is this quality criterion useful for the statement of medical care in the field of anesthesiology-resuscitation?			
5. Will this quality criterion be provided by anesthesiologists-resuscitators?			
6. Is the quality criterion applicable in any medical organization that provides medical care to the adult population in the field of anesthesiology-resuscitation?			

Table 2. The indicators of expert assessment of quality criteria of medical care of the methodological recommendation

Assessment criterion	% of positive answers
Is information on the diagnosis, treatment, rehabilitation, outpatient (dispensary) observation and prevention of the disease presented in clinical (methodological) recommendations to the extent that allows to ensure the medical care quality?	86.7
The information about patients to whom clinical (methodological) recommendations will be applied is presented in an amount that allows to ensure the medical care quality including the age and gender group of patients, is information about concomitant diseases and complications given?	86.7
Are the options for providing medical care for this disease described to an extent that allows you to ensure the quality of medical care?	93.7
The recommendations are unambiguous to understand, contain specific descriptions of what tactics, in what situation and which patients should be used, according to the totality of the available evidence?	68.7
Do you agree with the use of all the quality criteria of medical care specified in the clinical (methodological) recommendation?	43.6
Clinical (methodological) recommendations are accompanied by materials for their practical use (clinical scales, questionnaires, information for patients, etc.) by medical professionals in an amount that allows to ensure the medical care quality?	81.2
Do clinical (methodological) recommendations use international nonproprietary names or grouping (chemical) names of medicines and non-commercial names of medical devices (except in cases where these names are missing)?	100
Clinical (methodological) recommendations are developed with an indication of medical services provided for by the Nomenclature of Medical Services, approved by Order of the Ministry of Health of the Russian Federation dated October 13, 2017 No. 804n "On Approval of the Nomenclature of Medical Services"?	100
Are you ready to implement clinical (methodological) recommendations in the work of your medical institution?	93.7

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Appendix. Modified Delphi analysis of the guideline "The use of non-invasive lung ventilation"

Table A1. Proposed changes in the provisions of the methodological recommendation

Recommendation number	Statement to be changed
1	<p>In a patient with acute respiratory failure, based on the pathophysiology of respiratory failure, the technology of non-invasive mechanical ventilation (NIMV) and data from evidence-based medicine studies, its use is recommended for the following pathologies:</p> <ol style="list-style-type: none"> 1. Expiratory closure of the small airway (chronic obstructive pulmonary disease — COPD) — the patient is recommended oxygen therapy in combination with moderate PEEP / CPAP to facilitate expiratory flow and moderate inspiratory pressure to relieve the respiratory muscles. 2. Hypoxemic (parenchymatous) ARF with a low potential for alveoli recruitment (pneumonia, pulmonary contusion, pulmonary embolism with the development of infarction pneumonia, condition after lung resection) — the patient is recommended oxygen therapy in combination with low PEEP / CPAP and low inspiratory pressure (Pinsp, IPAP, PS) to unload the respiratory muscles 3. Hypoxemic ARF with a low potential for alveoli recruitment in combination with immunosuppression (pneumocystis pneumonia, ARF in oncohematology, ARF after solid organ transplantation) — the patient is recommended oxygen therapy in combination with moderate PEEP / CPAP and moderate inspiratory pressure to unload the respiratory muscles. 4. Acute left ventricular insufficiency and cardiogenic pulmonary edema — the patient is recommended oxygen therapy in combination with moderate PEEP / CPAP to reduce the pump work of the left ventricle and moderate inspiratory pressure to unload the respiratory muscles 5. Prevention of postoperative atelectasis in high-risk patients (obesity, immunosuppression, COPD with hypercapnia, thoracic surgery) — the patient is recommended moderate PEEP / CPAP for prophylaxis.
2	In patients with acute respiratory failure who are indicated for NIVL, its use is recommended only under the following conditions: preservation of consciousness, the ability to cooperate with staff, the absence of claustrophobia (when using helmets) and the functioning of the entire mechanism of coughing up sputum
4	In patients with ARF, the use of NIV instead of oxygen therapy (through a face mask or cannula) is recommended to improve gas exchange, reduce respiratory activity and improve prognosis in the following conditions: exacerbation of COPD (with the development of moderate respiratory acidosis ($7.35 > \text{pH} > 7.25$) and compensated ARF)
6	In patients with severe exacerbation of bronchial asthma, NIV is not recommended, drug therapy in combination with oxygen therapy is indicated, and with the progression of ARF (life-threatening asthma), only invasive mechanical ventilation is recommended, NIV is contraindicated
8	In patients with hypoxemic (parenchymal) ARF, non-invasive mechanical ventilation is recommended with a combination of low alveoli recruitment with slightly reduced or normal compliance of the lungs and chest wall (primary pathology of the lung parenchyma) as first-line therapy, especially in immunosuppressed patients; It is possible that high-flow oxygen therapy has an advantage in this category of patients. These conditions include: community-acquired pneumonia with an initial oxygenation index of more than 150 mm Hg.
11	In patients at risk (COPD with hypercapnia, obesity with hypercapnia, congestive heart failure) after surgery, NIV is recommended to prevent the development of post-extubation ARF, it leads to a decrease in the frequency of tracheal intubations and a decrease in mortality; the use of non-invasive mechanical ventilation in these groups of patients with already developed post-extubation ARF is ineffective and can lead to delayed tracheal intubation and worsening of the prognosis

Suggested change	Explanation for the authors of the recommendations
<p>In a patient with acute respiratory failure, the use of non-invasive mechanical ventilation is recommended for the following critical conditions:</p> <ol style="list-style-type: none"> 1. Expiratory airway closure (chronic obstructive pulmonary disease — COPD) — oxygen therapy in combination with PEEP/CPAP to facilitate expiratory flow and moderate inspiratory pressure to relieve respiratory muscles. 2. Hypoxemic (parenchymatous) ARF with a low potential for alveoli recruitment (pneumonia, pulmonary contusion, pulmonary embolism with the development of infarction pneumonia, condition after lung resection) — oxygen therapy in combination with PEEP / CPAP and low inspiratory pressure to unload the respiratory muscles 3. Hypoxemic ARF with a low potential for alveoli recruitment in combination with immunosuppression (Pneumocystis pneumonia, ARF in oncohematology, ARF after solid organ transplantation) — the patient is recommended oxygen therapy in combination with PEEP / CPAP and moderate inspiratory pressure to unload the respiratory muscles 4. Acute left ventricular failure and cardiogenic pulmonary edema — oxygen therapy in combination with PEEP / CPAP to reduce the pump work of the left ventricle by reducing its pre- and afterload and moderate inspiratory pressure to unload the respiratory muscles. 5. Prevention of postoperative atelectasis in high-risk patients (obesity, immunosuppression, COPD with hypercapnia, thoracic surgery) — PEEP/CPAP for the prevention of atelectasis 	<p>Specify the PEEP/CPAP values. Clarify or give clinical examples of immunosuppressive conditions.</p> <p>For example: NIV can be successfully used in immunosuppressive conditions, for example, in severe pneumonia [Hilbert G., Gruson D., Vargas F., et al. Noninvasive ventilation in immunosuppressed patients with pulmonary infiltrates, fever, and acute respiratory failure. <i>N Engl J Med.</i> 2001; 344(7): 481–7], hypoxemic respiratory failure in [Rathi N.K., Haque S.A., Nates R., et al. Noninvasive positive pressure ventilation vs invasive mechanical ventilation as first-line therapy for acute hypoxemic respiratory failure in cancer patients. <i>J Crit Care.</i> 2017; 39: 56–61], Graft-versus-host reactions [Cortegiani A., Madotto F., Gregoretti C., et al. Immunocompromised patients with acute respiratory distress syndrome: secondary analysis of the LUNG SAFE database. <i>Crit Care.</i> 2018; 22(1): 157].</p> <p>NIV reduces in-hospital and 30-day mortality in immunodeprived patients [Wang T., Zhang L., Luo K., et al. Noninvasive versus invasive mechanical ventilation for immunocompromised patients with acute respiratory failure: a systematic review and meta-analysis. <i>BMC Pulm Med.</i> 2016; 16(1): 129].</p> <p>At the same time, immunosuppressive conditions are not predictors of NIV ineffectiveness and do not lead to an increased risk of tracheal intubation [Coudroy R., Pham T., Boissier F., et al. Is immunosuppression status a risk factor for noninvasive ventilation failure in patients with acute hypoxemic respiratory failure? A post hoc matched analysis. <i>Ann Intensive Care.</i> 2019; 9(1): 90. DOI: 10.1186/s13613-019-0566-z]</p>
<p>In patients with ARF, the use of non-invasive mechanical ventilation is recommended only under the following conditions: preservation of consciousness, the ability to cooperate with staff, the absence of claustrophobia (with the use of helmets) and the ability to cough up phlegm</p>	
	Supplement the information with the criteria of compensated ARF
<p>In severe exacerbation of bronchial asthma, drug and oxygen therapy are indicated. With the progression of the condition — invasive mechanical ventilation. NIV is contraindicated.</p>	
<p>In patients with hypoxemic (parenchymal) ARF, non-invasive mechanical ventilation is recommended with a combination of low alveoli recruitment with slightly reduced or normal compliance of the lungs and chest wall (primary pathology of the lung parenchyma) as first-line therapy, especially in patients with immunosuppression (perhaps high-flow oxygen therapy has an advantage in this category of patients)</p>	<p>In the context of new data on NIV in a new coronavirus infection, remove the indication of the presence of an oxygenation index of more than 150 mm Hg</p>
<p>In patients at risk (COPD with hypercapnia, obesity with hypercapnia, congestive heart failure) after surgery, NIV is recommended to prevent the development of ARF, it leads to a decrease in the frequency of tracheal intubations and a decrease in mortality</p>	

Recommendation number	Statement to be changed
12	<p>Non-invasive respiratory support is not recommended in the following cases (confidence level of evidence 3, level of persuasiveness of recommendations B):</p> <ol style="list-style-type: none"> 1) lack of spontaneous breathing (apnea); 2) unstable hemodynamics (hypotension, ischemia or myocardial infarction, life-threatening arrhythmia, uncontrolled arterial hypertension); 3) inability to provide airway protection (coughing and swallowing disorders) and high risk of aspiration; 4) excessive bronchial secretion; 5) signs of impaired consciousness (excitation or depression of consciousness), the patient's inability to cooperate with medical personnel; 6) facial trauma, burns, anatomical abnormalities that prevent the mask use; 7) severe obesity; 8) the patient's inability to remove the mask from the face in case of vomiting; 9) active bleeding from the gastrointestinal tract; 10) upper airway obstruction; 11) discomfort from the mask; 12) upper respiratory tract surgery
17	In patients with anticipated difficult tracheal intubation, the use of high-flow oxygenation is recommended, as this reduces the incidence of desaturation during tracheal intubation
18	In patients undergoing palliative care high-flow oxygenation is recommended as this avoids mechanical ventilation

Suggested change	Explanation for the authors of the recommendations
<p>NIV is not recommended in the following cases:</p> <ol style="list-style-type: none"> 1) lack of spontaneous breathing (apnea); 2) unstable hemodynamics (hypotension, ischemia or myocardial infarction, life-threatening arrhythmia, uncontrolled arterial hypertension); 3) inability to provide airway protection (coughing and swallowing disorders) and high risk of aspiration; 4) excessive bronchial secretion; 5) signs of impaired consciousness (excitation or depression of consciousness, score according to RASS > + 1 or from -3 to -5), the patient's inability to cooperate with medical personnel; 6) facial trauma, burns, anatomical abnormalities that prevent the mask use; 7) severe obesity; 8) the patient's inability to remove the mask from the face in case of vomiting; 9) active GI bleeding; 10) upper airway obstruction; 11) discomfort from the mask; 12) upper respiratory tract surgery 	<p>The amended text is in italics in paragraph 5, represented by data from the RASS scale (level of certainty of evidence 2, level of persuasiveness of recommendations B) [9–11]</p>
<p>In patients with anticipated difficult tracheal intubation, the use of high-flow oxygenation is recommended</p>	
<p>In patients undergoing palliative care HFO is recommended as mechanical ventilation is not indicated for this category of patients</p>	