

Authors:

Dr Junainah Sabirin
Madam Mariammah a/p
Krishnasamy

Expert Committee:

Datin Dr Hajah Aziah bt Ahmad
Mahayiddin
Dato' Dr Abdul Razak Muttalif
Dr Norzila Md Zainuddin
Datin Dr Rugayah Bakri

External Reviewer:

Dr George Kutty Simon
Dr Norrashidah Hj. Abd Wahab

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Health Technology Assessment
Section (MaHTAS)
Medical Development Division
Ministry of Health Malaysia
Level 4, Block E1, Precinct 1
Government Office Complex
62590 Putrajaya.

Tel: 603 8883 1246

Fax: 603 8883 1230

Available at the following website:
<http://www.moh.gov.my>

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Background

Several lung diseases including asthma and chronic obstructive pulmonary disease (COPD) involve chronic inflammation of the airways. Therefore, there is great interest in non-invasive methods assessing airway inflammation. Measurement of bronchial hyper-responsiveness (BHR) and exhaled nitric oxide (NO) are examples of indirect markers for airway inflammation. Nitric oxide (NO) is a molecule produced endogenously in the lungs. It can be detected in exhaled air in animals and humans. Nitric oxide can be generated in the air passages by a synthase which is induced in several cell types by exposure to proinflammatory cytokines. Its induction is blocked by glucocorticoids.

Technical Features

Currently, nitric oxide measurement system (NIOX) or a new NIOX MINO are usually used as NO analyzers in many research and clinical use. The NIOX system uses a chemiluminescence gas analyzer that can measure low concentrations of NO. NIOX MINO is a newer, smaller, hand held device for the measurement of airway inflammation based on the established NIOX monitoring system, which detects and measures levels of exhaled nitric oxide. NIOX MINO uses electrochemical sensor technology.

Policy Question

Should exhaled nitric oxide measurement using NIOX or NIOX MINO be used in Ministry of Health facilities for respiratory diseases?

Objective

To assess the safety, effectiveness and cost-effectiveness of exhaled nitric oxide measurement using NIOX or NIOX MINO in the management of respiratory diseases especially asthma.

Methods

Database such as PubMed, Ovid Fulltext, ProQuest, Cochrane databases, Food and Drug Administration (FDA) and HTA databases were searched. Relevant articles were appraised using Critical Appraisal Skill Programme (CASP) and evidence was graded according to Oxford Centre for Evidence-based medicine Levels of Evidence (May 2001).

Result and conclusion

In conclusion, there was evidence to suggest that FE_{NO} measurement is safe and non invasive. There was also good level of evidence to show that there is good correlation between the FE_{NO} values measured with the two devices (NIOX and XIOX MINO). In terms of diagnosis of asthma, FE_{NO} measurement provides superior diagnostic accuracy compared to conventional tests. Exhaled nitric oxide measurement can be used as a predictor of steroid response and loss of control (LOC) in asthma following steroid withdrawal. However, there was limited evidence to establish the relationship between exhaled nitric oxide levels and compliance with inhaled corticosteroids and its role in diagnosis and monitoring of other respiratory diseases.

Recommendation

Based on the above review, it is recommended that exhaled nitric oxide measurement can be used in Ministry of Health facilities with chest physicians (adult and paediatric) particularly for diagnosing and monitoring of asthma. The new NIOX MINO is preferred. More clinical research is warranted for other respiratory diseases such as COPD and bronchiectasis.