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Review Article

Evidence Based Medicine- Implementation in Clinical Practice

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Submitted: 27 June 2013

Accepted: 10 July 2013

Published: 02 August 2013

Keywords

- Evidence based medicine
- Guideline adherence
- Attitudes of health personnel

INTRODUCTION

Evidence based medicine is the conscientious and judicious use of current best evidence from clinical care research in the management of individual patients [1]. This requires a health-care professional to construct a structured clinical question based on identified patient problems, critically evaluate the evidence available in medical literature, and then incorporate this information to deliver the best care possible for patients, considering the overall clinical circumstances [2]. Therefore it is imperative that a healthcare professional is familiar with at least basic skills in scientific research methodology to effectively and critically evaluate the quality of presented evidence.

Clinical practice guidelines are "statements that include recommendations intended to optimize patient cares that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options". Trustworthy guidelines should be based on a systematic evidence review developed by panel of multidisciplinary experts, provide a clear explanation of the relationship between alternative care options and health outcomes, and provide ratings of both the quality of evidence and the strength of the recommendations [3]. Target populations must be clearly identified within the protocol.

Purpose of guidelines

The main purpose of a guideline is to provide the health-care professional with concise, convenient and a usable summary of available relevant research. This allows the professional to answer clinical questions in a synthesized manner. A guideline may serve as a reference document for various aspects of patient's care such as disease screening and prevention; evaluation and diagnosis; management and therapeutic efficacy; prognosis, and risk assessment [4].

A guideline may outline a diagnostic or treatment strategy to be employed for a patient's condition, intending to optimize clinical outcomes such as survival, morbidity, quality-of-life and/ or health-care costs based on prior research. In other instances, guidelines may serve to standardize healthcare practices despite lack of clear demonstration of benefits. This frequently includes performance of diagnostic tests such as measurement of International Normalized Ratio or INR while receiving warfarin. Another example relates to differences in definition of obstructive defect based on spirometry between American Thoracic Society/ European Respiratory Society (ATS/ ERS) [5] and Global Initiative for Chronic Obstructive Lung Disease (GOLD) [6]. By standardizing practices and therefore decreasing variation in practices, it can facilitate exchange of healthcare information between healthcare professionals and/or facilities, as well as aid healthcare research practices. This may also facilitate resource management for health care facilities.

Examples of deviation from guidelines

The investigators of the Acute Respiratory Distress Syndrome Network (ARDSNet) in the year 2000 demonstrated mortality benefit from use of lower tidal volume (6 cc/kg of predicted body weight) v/s higher volume (12 cc/kg of predicted body weight) during mechanical ventilation. Acute respiratory distress syndrome/ acute lung injury (ARDS/ ALI) among study subjects was related to various etiologies such as pneumonia, sepsis, trauma, transfusion-related lung injury, etc. [7]. Several studies to date have evaluated the percolation of this readily available life-saving therapy to critically ill patients with ARDS/ ALI [8-13]. The adoption of the low-tidal volume strategy is noted to be ~50% at best until 2011. The barriers to using low tidal volume ventilation related to failure to recognize ARDS/ ALI, use of other preferred modes of ventilation, healthcare professions (physicians or respiratory therapists) being unwilling to relinquish ventilator control, concerns over patient discomfort, or believing that low volumes were either inadequate for respiratory function or unsafe for patients [14] and open-ICU staffing model [15].

Among critically ill patients, the problem is not limited to mechanical ventilation practices. Other beneficial therapies such as stress ulcer prophylaxis, deep-vein thrombosis prophylaxis, sedation interruption, daily spontaneous breathing trial, head-of-bed elevation were provided to mechanically ventilated patients with varying degrees of success, and only one-quarter of patients received the entire bundle of the above therapies [16].

Another example relates to compliance with guidelines for performance and interpretation of spirometry. The American Thoracic Society/ European Respiratory Society Task Force

published the interpretive strategies for lung function tests in 2005. The Society proposed use of National Health and Nutrition Examination Survey (NHANES III) reference equations to generate "normal ranges" for subjects between ages of 8-80 years. Obstructive abnormalities were defined by a reduced FEV1/VC ratio below the 5th percentile of the predicted value for a given subject [5]. Significant variation from published standards was noted in the use of reference equations and interpretive strategies in 17 pulmonary function testing laboratories at large medical centers of Northeast Ohio [17]. We found that 6 laboratories used the reference equations based on NHANES III reference equations, and only 3 laboratories reported "lower limit of normal" on their PFT reports to enable accurate interpretation of testing. Thus only 3/17 (18%) laboratories complied with the published guidelines. The reasons for non-compliance included lack of awareness about guidelines, lack of understanding of guidelines, presence of multiple guidelines from different societies, inertia of maintaining consistency in their own practices over time and past physician recommendations. Technical difficulties included inability to generate reports from spirometry computer.

Problems with implementing guidelines

Several investigators have systematically evaluated the various stages of learning and implementation of "change" from adopting a new guideline. The failure to apply published guidelines to the care of a patient can be directly related to various stages of behavior change. Broadly, the stages can be categorized as knowledge, attitudes and behavior [18,19].

Knowledge barriers could be related to lack of awareness of evidence, or lack of familiarity with current guidelines. Physicians consider published research findings as the most powerful determinant of healthcare interventions, but are frequently unaware of many relevant trials [20]. Reasons appear obvious when we consider that there are at least 212 guidelines for disease evaluation and 160 for disease management listed in pulmonary medicine on the National Guideline Clearinghouse [4]. Corresponding numbers are 135 and 183 for critical care medicine, and many times there are multiple guidelines related to same topic from different professional societies.

Attitude barriers relate to assimilation and acceptance of a given guideline as being potentially useful. Healthcare practitioners evaluate whether the guideline is "true and useful" for practice. The barriers related to attitude are perhaps the most difficult to overcome and include obstacles such as lack of motivation to change current practices, lack of agreement with guidelines, or lack of want to relinquish control of care to a "protocol".

The final stage in implementation of guidelines is the change in actual behavior. Barriers may be related to guideline itself, such as being too long or complicated for use. Barriers may relate to external factors such as inadequate staffing, material resources, inadequate number of patients/ tests, or lack of acceptance of the guideline by patients (e.g. blood transfusion among Jehovah's witnesses).

Methods to implement guidelines

In a survey of ICU physicians in 2004, nearly 90% ICU physicians considered low-tidal volume ventilation as a probable or definite benefit in caring for patients with ARDS/ ALI, but only 65% physicians reported using it for all patients [20]. Therefore, education in and by itself is only marginally effective at influencing change. In the era of multidisciplinary patient care teams involving physicians and several non-physicians (physician assistants, nurse practitioners, respiratory therapists, nurses, dietician, etc.) multifaceted team approaches that incorporate reminders, and use all team members efficiently are needed to effect change.

Kotter described 8 stages of change: establishing a sense of urgency, creating the guiding coalition, developing a vision and strategy, communicating the change vision, empowering broad-based action, generating short-term wins, consolidating gains and producing more change, and anchoring new changes in the culture [21]. Similar strategies to applying evidence to practice have been described by experts in medicine [14,18].

Guidelines and protocols may be driven by health care professionals or technology. Several randomized controlled studies have identified early weaning benefit to using respiratory therapist and nurses driven protocols for liberation from mechanical ventilation [22-25]. Computer algorithms have been shown to improve compliance with low-tidal volume ventilation among patients with ARDS/ ALI by sensing ventilator parameters outside the expected limits [26] and by sending alerts to health care team [27].

Overall, the choice of behavioral change strategy should be based on the evidence and the expected benefit from the intervention. Interventions that are proven to be consistently effective and/ or have a strong impact should be implemented using a multifaceted approach (combining 2 or more of feedback, reminders, education and marketing). Academic details in the guideline and reminders/ prompts are helpful. For moderately or variably effective interventions, economic incentives, audit and feedback, and local opinion leaders should be employed. For weakly effective interventions, passive education by means of lectures, posters, distribution of guidelines are suggested [14].

CONCLUSIONS

There is ample evidence that research-proven best practices frequently do not make it to patient's bedside. Development of guidelines or protocols for patient care can help effect beneficial changes that optimize patient outcomes. Due to a glut of guidelines in medicine, protocols for a healthcare facility should be developed based on patient care needs, the quality of evidence and the expected impact from implementing a guideline. We as healthcare professionals need to take time to review and reflect on our own practices, effect needed change and bring the best and most currently available knowledge to patient's bedside. It is our professional duty.

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Cite this article

Mohanka MR (2013) Evidence Based Medicine- Implementation in Clinical Practice. Clin Res Pulmonol 1: 1003.