A standardized guideline-based algorithm coupled with online decision-making tool: the new frontier for efficient management of syncope?

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The status quo

Despite significant progress in the past three decades including the publication of guidelines, the development of several emergency room syncope decision rules and more generic risk scores, and the institution of formal dedicated syncope facilities, the management (diagnosis and therapy) of syncope is still largely unsatisfactory.

A Position Paper commissioned by the Canadian Cardiovascular Society[1] addresses the quality of evidence of the standardized methods of management of syncope proposed in recent years and gave pragmatic interpretation of strong vs. weak recommendations based on the GRADE system.[2] In brief, there is little persuasive evidence that emergency room syncope rules and diagnostic syncope units provide efficient care and improved outcomes. While we congratulate the Canadian colleagues for their objective comprehensive evaluation, we think their conclusions reflect some major pitfalls that persist in the approach to patients with syncope:

(1) Difficulty identifying patients at high risk (in particular those at short-term risk). This problem inevitably leads to an increase in the number of inappropriate hospitalizations, tests utilization, and eventually higher costs.

(2) High rate of unexplained diagnosis. It seems that the most complex (i.e. with competing possible causes) and potentially severe syncope cases that require specialized treatment remain undiagnosed.[3] Indeed, patients with unexplained syncope tend to be older and more frequently have structural heart disease or electrocardiographic abnormalities. Conversely, a diagnosis is more easily obtained in healthy young patients without structural heart disease, who are known to have a favourable outcome. The paradox is that the more we need a precise diagnosis, the more difficult it is to obtain one.

(3) High rate of misdiagnosis. Typically patients are asymptomatic at the time of evaluation and the opportunity to capture a spontaneous event during diagnostic testing is rare. This type of reasoning leads to uncertainty in establishing a cause. In other words, the causal relationship between a diagnostic abnormality and syncope in a given patient is often presumptive. Uncertainty regarding diagnostic definitions hampers comparison between different studies and the evaluation of treatments. The consequence is that syncope still recurs after diagnosis despite proper therapy in a significant proportion of patients. For example, in the EGSYS 2 (Evaluation of Guidelines in SYncope Study) follow-up report,[4] syncope recurrence rate was, 12.5 per 100 patient-years in patients with syncope due to primary cardiac arrhythmia (9.1 per 100 patient years in those who received specific treatment, i.e. a pacemaker, an internal cardioverter defibrillator or ablation), 14.9 per 100 patient-years in patients with structural cardiac or cardiopulmonary syncope, 9.8 per 100 patient-years in patients with neurally mediated syncope and in 8.8 per 100 patient-years in patients with orthostatic syncope.

(4) Difficulty disseminating the knowledge to clinical practice. Despite the development of standardized care protocols based on substantial scientific evidence, the dissemination of these concepts into clinical practice remains a challenge. Indeed, the management of patients with syncope requires organizational solutions that are probably quite different from other clinical situations. Syncope is a frequent symptom that may be a manifestation of normal physiology gone awry or many different diseases. Therefore, virtually all physicians, including primary care, cardiology, internal and emergency medicine, geriatrics, neurology, psychiatry, orthopaedics, etc. may need to be involved in the care of syncope patients and depending on the circumstances, each of these specialties

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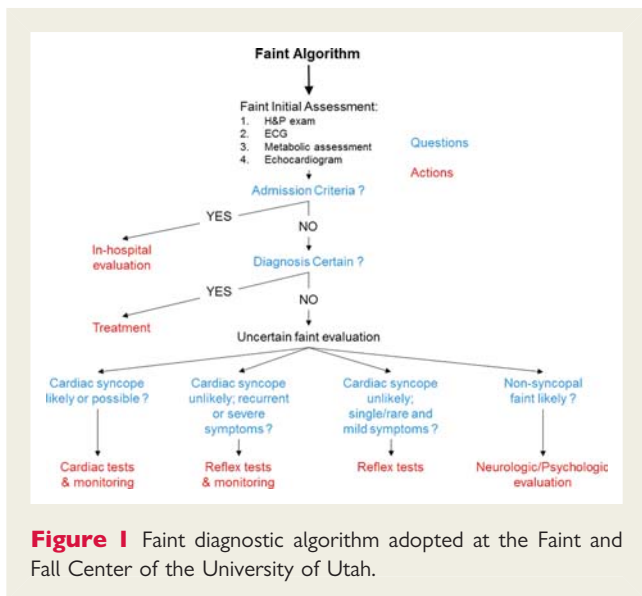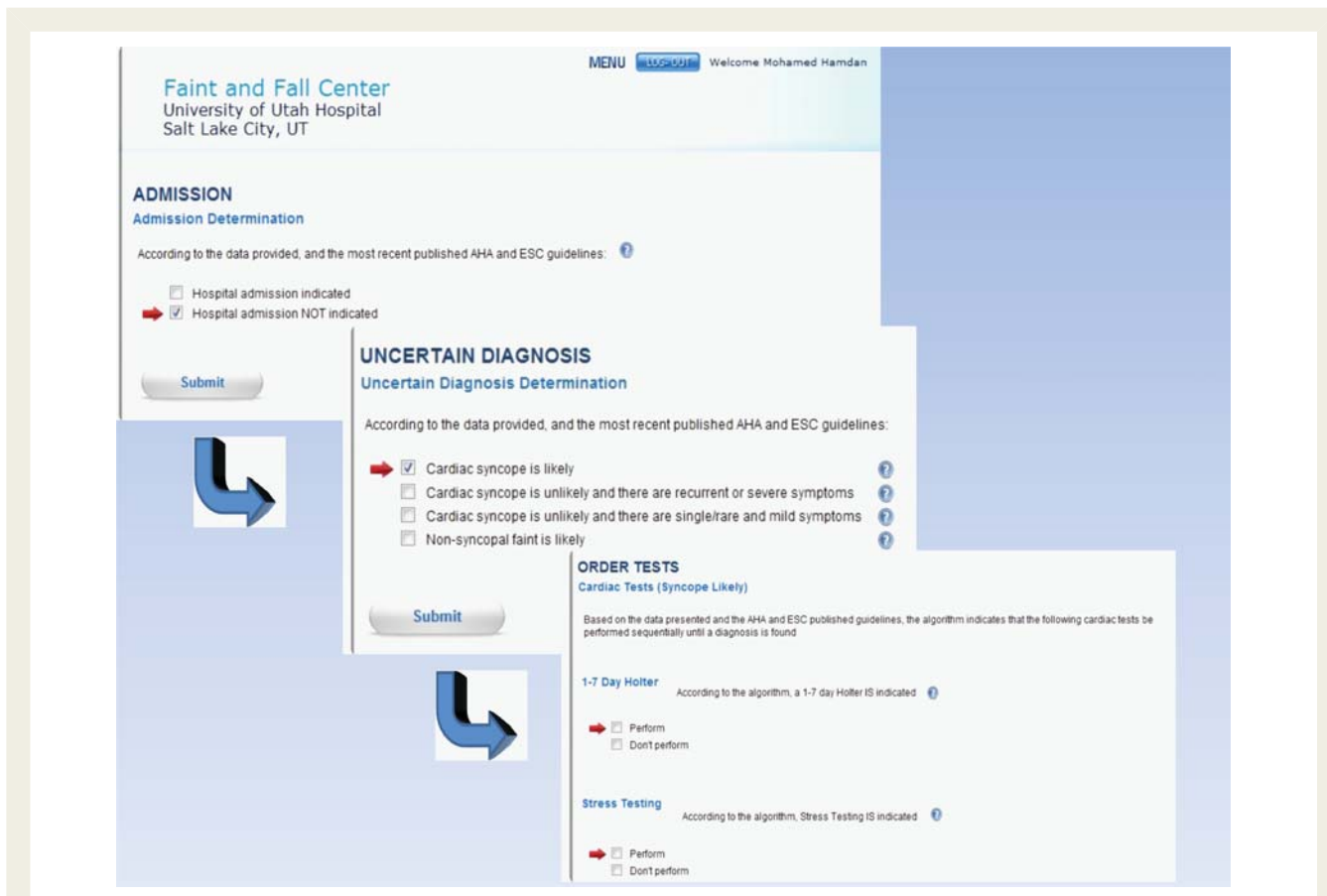
Figure 1 Faint diagnostic algorithm adopted at the Faint and Fall Center of the University of Utah.

may need to take a leading role. In practice however, education and training of such a significant number of stakeholders is virtually impossible to achieve.

The new frontier

Interestingly, the Position Paper of the Canadian Cardiovascular Society[1] raises some optimism regarding the development and implementation of a new strategy, i.e. the introduction in the clinical practice of standardized guideline-based algorithms coupled with online decision-making software. The rationale for their usage is that a web-based online interactive decision-making software can be of help to the physician to follow the diagnostic pathway and the recommendations of the guidelines and therefore to prescribe the most appropriate evidence-based therapy. Since they are not intended as a surrogate of physician's skills, their utilization still require the interaction with a physician expert in the field who can take care of a comprehensive management of the patient.

Figure 2 Faint diagnostic algorithm: an example of the assessment of the appropriateness of the diagnostic tests according to the most likely diagnostic category.

Since some readers might not be aware of this new approach, we would like to describe the early experience with the implementation of such a strategy at the Faint and Fall Center of the University of Utah (USA). We developed a Faint Algorithm (F2 Solutions Inc., Sandy Utah, Utah) that integrated the recommendations of the most recent guidelines on syncope of the European Society of Cardiology (ESC)[5] in a structured diagnostic pathway (*Figure 1*). These guidelines, made by the largest international (Europe, USA, Canada, and Japan) and multidisciplinary (cardiologists, internist, emergency doctors, neurologist, and geriatricians) consortium of experts give comprehensive recommendations for all the aspects of transient loss of consciousness and are consistent with the diagnostic approach for risk stratification suggested by an American Heart Association (AHA) Statement.[6]

In brief, as a first step, based on the data of the initial evaluation, which consist of history, physical examination, 12-lead electrocardiogram, echocardiogram, and metabolic assessment (if appropriate), the software determines whether the patient meets short-term risk criteria that warrant admission. The physician decides whether to agree or disagree with this advice. If not admitted, the second step consists of verifying whether a likely diagnosis is possible on the basis of the available information. Again, the physician is allowed to accept or not this advice. If making a diagnosis is not possible, the third step is the assessment of the appropriateness of the diagnostic tests according to the most likely diagnostic category based again on the most recent ESC- and AHA-published guidelines (*Figure 2*). In addition to the steps above, the software contains several forms for data collection, resource consumption, and therapeutic strategies. At each step, the physician is provided with informational resources to help with the diagnosis and management of patients with fainting spells. The ultimate decision is based on the physician's medical judgement.

The process of validation of this new strategy of management of patients with syncope is ongoing. We anticipate the results from patients presenting with syncope to the emergency department[7] and in the outpatient setting at the University of Utah Medical Center.[8] In one study,[7] the prevalence of serious events within 7 days of the presentation was documented in 254 consecutive patients presenting in the Emergency Department and admissions and discharges were classified as being appropriate or inappropriate based on the new Faint Algorithm. The prevalence of serious events in the admission group was low (9%) and did not justify most of the admissions. According to the newly developed guideline-based Faint Algorithm, 8% of the discharges and 58% of the admissions were inappropriate. The utilization of the Faint Algorithm would have allowed a safe 52% reduction in admission rate without a significant difference in the prevalence of serious events in the discharged group.

In another study,[8] we documented the management of patients triaged as faint at the University of Utah Medical Center and its affiliated clinics. We found significant discrepancies between clinical practice and the standardized management of patients with faint as highlighted by the Faint Algorithm. In some cases, tests were performed in the absence of clear indications and conversely, in other cases many tests should have been performed and were not. More importantly, a final diagnosis was made in only 45% of the cases with 38% of the final diagnosis lacking the evidence needed to support the final assessment as defined by the guidelines.

The above results suggest that the introduction in the clinical practice of standardized guideline-based algorithms coupled with online decision-making software could result in an improvement in patient care and a reduction in cost by decreasing the number of inappropriate discharges and admissions. However, this new strategy needs further validation studies before it can become accepted as current practice.

Conflict of interest: The authors are the inventors of the software described in this article. They have financial interest in the start-up company that has exclusive rights to the software product.

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