HEART SENSE:
A Game-Based Approach to Reducing Delay in Seeking Care for
Acute Coronary Syndrome

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Background. Between 26 and 44 percent of the 1.25 million victims of acute coronary syndrome
delay in seeking prompt care for this condition. Attempts to reduce delay have focused on pedagogical
materials, such as pamphlets and public service announcements that aim to instruct the user by forcing
memorization of concepts. Given the high rate of delay in seeking care, it is clear that these methods are
at best only partially effective. An alternative approach relies on constructivist pedagogy that
minimizes rote learning by incorporating the trainee into a realistic, non-threatening scenario in which she
discovers for herself the key elements of the material to be learned. We report here on the development
of a prototype system, HEART SENSE, which employs this pedagogical methodology to reduce delay in
seeking care for acute coronary syndrome.

System. HEART SENSE is a game-based training system for use by lay (non-medical) persons who are
either at risk of a first myocardial infarction or are associated with a person who is at such risk. The
system has two goals: to improve the lay public’s early recognition of acute coronary syndrome, and
once recognized, to reduce delay in seeking care. HEART SENSE uses a decision tree-like structure for
knowledge representation that guides the user through a series of cognitive states that are clearly identified in a
“patient” character. These states reflect the pathway from unawareness to self-determination, and are in
turn reflected emotionally in the patient through a rich set of facial expressions and body postures. The
patient was designed to be identifiable with the user, on the basis of race, age, and sex. In addition to the
patient, a “helper” character was included to provide performance feedback to the user through spoken and
displayed text as well as emotions through facial expressions and physical movement. The goal of the
game is to make as few incorrect decisions as possible, within the context of a “virtual clock;” thus,
the best score will be obtained by making correct decisions quickly.

Knowledge Engineering. The knowledge contained in HEART SENSE will be expressed in four
scenarios, which were designed to capture four common situations. A “typical event” was
characterized by symptoms such as crushing retrosternal discomfort with radiation to the shoulder,
diaphoresis, and pallor. An “atypical event” focused on symptoms of dyspepsia. A “musculoskeletal
event” was preceded by heavy manual labor and was characterized by point and motion-related tenderness.
A “musculoskeletal-coronary event” combined the first and third scenarios. These scenarios will be
developed by a clinical team that included a cardiologist, a family practitioner, an emergency
medical technician. The scenarios will be reviewed by other clinical personnel and members of the
development team to ensure consistency and the ability to map the scenario text to program code.

Evaluation. A prototype of the HEART SENSE system has been developed using one scenario as a
proof of concept. Using this scenario, the software will be used in focus groups consisting of lay persons
who correspond to the targeted user group. Members of the groups will be asked to provide feedback on the
system’s interface and the flow and content of the software in general and the scenario specifically. In
addition, HEART SENSE will be evaluated by a panel of experts in cardiology, family practice, and lay
medical education. These evaluations will be used to refine the software for future use in a randomized
clinical trial to ascertain its efficacy in reducing delay in seeking care.

Conclusion. This project has produced a working prototype of a decision support system to help reduce
delay in seeking care for acute coronary syndrome. This prototype will provide a means to evaluate the
appropriateness of a constructivist pedagogy in training the lay public to recognize the symptoms of
acute coronary syndrome and to seek care quickly.

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