Evaluation of triage methods used to select patients with suspected pandemic influenza for hospital admission: cohort study

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**Executive summary**

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Executive summary

Background

The UK influenza pandemic contingency plan published in 2007 predicted around 750,000 excess emergency department attendances and 82,500 excess hospitalisations during a pandemic. Clinicians working in the emergency department need a rapid and reliable method for determining each patient’s risk of adverse outcome. Prior to the emergence of the 2009 H1N1 pandemic, Health Protection Agency (HPA) guidance, supported by the British Thoracic Society and British Infection Society, recommended the use of the CURB-65 (a risk prediction score for pneumonia, based on confusion, urea level, respiratory rate, blood pressure and age over 65 years) pneumonia score for adults. Department of Health guidelines on surge capacity in a pandemic also considered use of a physiological–social score [Pandemic Modified Early Warning Score (PMEWS)] for adults. National guidance produced in response to the emergence of H1N1 influenza included a new swine flu hospital pathway for emergency department management with seven criteria based upon a Community Assessment Tool (CAT) for adults and children. These potential triage methods have not been widely validated and, in particular, have not been tested in the setting of pandemic influenza.

Objectives

We aimed to use the initial waves of the 2009 H1N1 pandemic to evaluate existing emergency department triage methods for predicting severe illness or death in patients presenting with suspected pandemic influenza, and to determine whether an improved triage method could be developed. Our specific objectives were to determine:

1. the discriminant value of the CURB-65 score, PMEWS and the swine flu hospital pathway for predicting severe illness or death in adults presenting with suspected pandemic influenza and the discriminant value of the swine flu hospital pathway for predicting severe illness or death in children

2. the independent predictive value of presenting clinical characteristics and routine tests for severe illness or death in patients presenting with suspected pandemic influenza

3. whether the discriminant value of emergency department triage can be improved by developing two new triage methods based upon (1) presenting clinical characteristics alone and (2) presenting clinical characteristics, electrocardiogram, chest radiograph and routine blood test results.

Methods

We undertook a prospective cohort study of patients presenting to the emergency department of four hospitals with suspected pandemic influenza during the second wave of the 2009 H1N1 pandemic. Emergency department staff identified patients with suspected pandemic influenza and then completed a standardised assessment form that included the elements of the CURB-65 score, PMEWS, the swine flu hospital pathway and any other measures that could be routinely recorded in the emergency department.

Outcome assessment was based on researcher review of hospital computer records and case notes. Patients who died or required respiratory, cardiovascular or renal support during the 30-day follow-up were defined as having a poor outcome. Patients who survived to 30 days without requiring respiratory, cardiovascular or renal support were defined as having a good outcome. We also recorded whether they were treated with antiviral agents or antibiotics, and the length and location of any hospital stay.

We planned to assess CURB-65, PMEWS and the swine flu clinical pathway by calculating the area under the receiver–operator characteristic curve (C-statistic) for discriminating between cases with and without a poor outcome. We also planned to use multivariable logistic regression to determine the independent predictive value of presenting clinical characteristics and routine tests and to develop two new triage scores: one based on
Results

The 2009 H1N1 pandemic was much smaller and less severe than predicted. Data were collected and analysed from 481 cases across three hospitals in the second wave of the pandemic. Most of the cases were children, with 347 out of 481 (72%) aged 16 years or less. There were only five poor outcomes according to our definition: two deaths and three survivors who required respiratory support. We therefore lacked sufficient data to determine the independent predictive value of presenting clinical characteristics and routine tests or develop any new triage methods.

The five patients with poor outcomes had CURB-65 scores of zero, one (three cases) and two, and PMEWS scores of one, five, six, seven and eight. The swine flu hospital pathway was positive in three out of five cases. The C-statistic for each method was CURB-65 0.78 [95% confidence interval (CI) 0.58 to 0.99], PMEWS 0.77 (0.55 to 0.99) and the swine flu hospital pathway 0.70 (0.45 to 0.96).

Patients with a higher CURB-65 score were more likely to be admitted (p < 0.001): 25 out of 101 (25%) with a score of zero, 11 out of 24 (46%) with a score of one, 7 out of 8 (88%) with a score of two, and the patient with a score of three were admitted. Admitted patients had a higher mean PMEWS score (4.6 vs 2.0, p < 0.001). The C-statistics for CURB-65, PMEWS and the swine flu hospital pathway in adults in terms of discriminating between those admitted and discharged were 0.65 (95% CI 0.54 to 0.76), 0.76 (95% CI 0.66 to 0.86) and 0.62 (95% CI 0.51 to 0.72) respectively.

Conclusions

We can draw no reliable conclusions from the data available other than raise potential concerns about the use of existing triage methods for patients with suspected pandemic influenza. Our very limited data suggest these methods may fail to discriminate between patients who will have an adverse outcome and those with a benign course. Furthermore, clinicians in our study did not generally appear to admit or discharge on the basis of these tools, despite being recommended for use in the pandemic.

Implications for practice

In the absence of evidence for the use of these triage tools, emergency department clinicians should continue to base triage decisions for patients with suspected pandemic influenza upon their clinical judgement.

Recommendations for research

Further research is required to evaluate existing triage tools and develop new triage methods for suspected pandemic influenza. This may require evaluation in surrogate conditions, such as pneumonia or seasonal influenza. Research is also required to determine the feasibility and acceptability to patients of undertaking research during a pandemic using confidential patient information without consent.

Publication

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This themed issue of the Health Technology Assessment journal series contains a collection of research commissioned by the NIHR as part of the Department of Health’s (DH) response to the H1N1 swine flu pandemic. The NIHR through the NIHR Evaluation Trials and Studies Coordinating Centre (NETSCC) commissioned a number of research projects looking into the treatment and management of H1N1 influenza.

NETSCC managed the pandemic flu research over a very short timescale in two ways. Firstly, it responded to urgent national research priority areas identified by the Scientific Advisory Group in Emergencies (SAGE). Secondly, a call for research proposals to inform policy and patient care in the current influenza pandemic was issued in June 2009. All research proposals went through a process of academic peer review by clinicians and methodologists as well as being reviewed by a specially convened NIHR Flu Commissioning Board.

The final reports from these projects have been peer reviewed by a number of independent expert referees before publication in this journal series.

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The research reports in this themed issue were funded through the Cochrane Collaboration; the Health Services Research programme (HSR); the Health Technology Assessment programme (HTA); the Policy Research Programme (PRP); the Public Health Research programme (PHR); and the Service Delivery and Organisation Programme (SDO).

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