

BRIEF REVIEW ΒΡΑΧΕΙΑ ΑΝΑΣΚΟΠΗΣΗ

The usefulness of point-of-care testing for diagnosis in cases suspicious for swine flu

ARCHIVES OF HELLENIC MEDICINE 2010, 27(4):640–642
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2010, 27(4):640–642

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Χρησιμότητα των αρχικών
εξετάσεων για τη διάγνωση
ύποπτης γρίπης των χοίρων

Περίληψη στο τέλος του άρθρου

Key words

Diagnosis
Point-of-care testing
Swine flu

Submitted 25.10.2009

Accepted 11.11.2009

1. INTRODUCTION

Novel influenza or swine flu is the newest infection that is of current global concern. Pandemic spread of this infection has occurred in 2009, attracting the attention of medical scientists around the world.^{1–3} As a respiratory infection, its transmission from human to human is easy. Respiratory signs and symptoms are common in swine flu and the classic clinical influenza presentation as high fever with respiratory manifestations can be seen,^{1–3} so the form of presentation cannot be useful for discrimination between swine flu and other acute febrile illnesses, especially classical influenza.^{1–3}

Since swine flu is an infection for which specific antiviral drug treatment is available, the early diagnosis of infection is helpful and results in a good clinical outcome.⁴ To diagnose swine flu, laboratory investigation plays an important role, but the definitive diagnosis based on PCR testing is time consuming, laborious and not cost effective. There are several problems related to the diagnosis of influenza in the present situation of pandemic swine flu (tab.1).^{1–3} The early screening for inclusion of the cases with influenza and exclusion of non influenza infection might be a more useful alternative. In addition to definitive diagnosis, screening for swine flu is necessary in the present state of pandemic. Because the antiviral drug treatment for classical and novel influenza is similar, the diagnosis of cases of influenza might be more appropriate in clinical practice.⁴

Due to the developments in point-of-care testing (POCT) technology at present, there are many new POCT laboratory tests that can be applied for this purpose. This

Table 1. Problems of diagnosis of influenza in the present pandemic of swine flu.

| Problems | Details |
|------------------------|---|
| Underdiagnosis | In some settings, it is suggested that there is no need for investigation for influenza. The reason given is that influenza can be self limiting. This practice can lead to the problem of further spread of the infection. |
| Insufficient diagnosis | In some settings, universal prescription of anti-influenza medication is suggested for any cases of acute febrile illness with respiratory manifestations in the pandemic situation. This practice might lead to success in disease control but can cause several problems, including the high cost of unnecessary antiviral drug usage, and the induction of drug resistant strains. In settings without good diagnostic tools, the influenza might be misdiagnosed and treated as acute bacterial infection and this can also give rise to several problems: First, the patients might not improve. Second, in the case where the patient is lucky and has self limiting influenza, the problem of future antibiotic-resistant bacterial infection can be expected. |
| Delayed diagnosis | Sometimes, there are complete systems in place for diagnosis of swine flu. In addition to the expensive cost, the time for waiting for the result is very long and this can lead to delay in diagnosis. |

paper summarizes and discusses important POCT tools that might be applicable for cases suspicious for swine flu. The first tool is the white blood cell test that can be useful for discrimination between bacterial and viral infection and the second tool is the influenza A/influenza B rapid test that can exclude non influenza virus infection.

2. POCT WHITE BLOOD CELL TEST

The POCT white blood cell test is a tool that can be applied in the mobile or field clinical unit that has to take care of many cases suspicious for new influenza during the pandemic. The basic concept of this test is rapid determination of the total white blood cell count (WBC) from a capillary blood sample of the patient. The automatic analyzer can give the result within a few minutes at the site without the need to collect venous blood and transfer it to the hospital laboratory. This can be applied in the case of acute febrile illness with respiratory signs and symptoms. The best known POCT analyzer is the HemoCue WBC device.⁵ This device makes use of a reagent pre-loaded disposable cuvette together with basic image analysis technology.⁵ Osei-Bimpong et al reported that "the HemoCue WBC is reliable for WBC counts within the analytical range of $0.4\text{--}30.0 \times 10^9/\text{L}$, except in samples where there are significant numbers of normoblasts or reticulocytes."⁵

The parameter "white blood cell count" can be applicable in the mobile setting. Leukocytosis, which usually implies neutrophilia, is more common in acute bacterial infection of the respiratory tract. The detection of leukocytosis can be a rationale for prescribing an antibacterial antibiotic, rather than an antiviral drug. This can reduce the unnecessary use of universal antiviral drugs in the pandemic situation, which is currently recommended in some local settings.

3. POCT INFLUENZA A/INFLUENZA B RAPID TEST

In the cases where there is no evidence of acute bacterial infection, the consideration of use of anti-influenza medication is the next step. It is then necessary to exclude other self-limiting viral infections that need no antiviral treatment. The diagnosis of influenza is also useful for surveillance. The usefulness of the concept of the POCT influenza test has been confirmed.⁶ Kayaba reported that most users, namely physicians in charge, were satisfied with these rapid POCT detection tests.⁶ To diagnose influenza, in

many pandemic settings, the use is recommended of the rapid flu test which is useful for detection of influenza A infections, which include swine flu. Chan et al found that "the analytical sensitivity of the selected influenza A antigen detection tests for detection of S-IOV was comparable with that of seasonal influenza H1N1."⁷ However, the rapid flu test is still not a satisfactory POCT tool and confirmation in the hospital laboratory is still needed. Recently, Vasoo et al evaluated three currently available systems and reported that the sensitivities "were low to moderate: BD Directigen EZ Flu A+B test (Becton Dickinson), 46.7%; BinaxNOW influenza A&B (Inverness Medical), 38.3%; and QuickVue influenza A+B Test (Quidel), 53.3%".⁸ Hurt et al reported that the three rapid POC tests could all detect the emergent swine lineage A(H1N1) virus when it was present in high virus concentrations, but the tests were significantly less sensitive than PCR assays, and negative results should be verified by a laboratory test.⁹ In addition, used as the only tool for detection of influenza A, there can be some problem cases of influenza B that are not detected and which can further contribute to the epidemic.

Recently, a new tool, the POCT influenza A/influenza B rapid test has been developed and this is useful for the determination of influenza cases in the pandemic status. This tool can be used at the bedside and gives the result within a few minutes. A positive result implies the need for using anti influenza medication. In a recent report, it was shown that the method of testing (POCT or not) does not appear to significantly alter physician management, cost, or length of stay but the POCT approach can reduce unnecessary laboratory investigations such as urinalysis and urine culture.¹⁰

4. FUTURE POCT TOOLS FOR SWINE FLU

The available POCT system for influenza detection in the pandemic state of swine flu still needs further development. Kost et al noted that the POCT system for influenza can become a kind of POCT for disaster situation in medicine,^{11,12} and that "a global effort must be made to improve POC technologies to rapidly diagnose and treat patients to improve triaging, on-site decision making, and, ultimately, economic and medical outcomes."¹¹ At present, there is a lack of a finalized tool for the definitive diagnosis of swine flu. The aim for the future is the development of a POCT PCR-based tool that can discriminate between several kinds of influenza in POCT diagnosis for cases suspicious for swine flu.

ΠΕΡΙΛΗΨΗ

Χρησιμότητα των αρχικών εξετάσεων για τη διάγνωση ύποπτης γρίπης των χοίρων

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Η γρίπη των χοίρων αποτελεί ένα νέο παγκόσμιο πρόβλημα. Η διάγνωσή της βασίζεται στα ευρήματα μεθόδου που στηρίζεται στην PCR. Εντούτοις, είναι αναγκαία η αναζήτηση της νόσου με μια μέθοδο ταχείας, μαζικής, πρωτογενούς αναζήτησης. Συνοψίζονται και συζητούνται ορισμένα σημαντικά σημεία διαφόρων μεθόδων που μπορούν να εφαρμοστούν σε ύποπτες περιπτώσεις γρίπης των χοίρων. Η πρώτη μέθοδος αφορά στη μέτρηση των λευκών που είναι χρήσιμη για τη διάκριση μεταξύ μικροβιακής και ιογενούς λοίμωξης, ενώ η δεύτερη είναι η ταχεία δοκιμασία για την influenza A/influenza B, που μπορεί να αποκλείσει τη λοίμωξη από γρίπη.

Λέξεις ευρητηρίου: Γρίπη των χοίρων, Διάγνωση

References

- SE BASTIAN MR, LODHA R, KABRA SK. Swine origin influenza (swine flu). *Indian J Pediatr* 2009, 76:833–841
- WIWANITKIT V. Swine flu: The present pandemic infectious disease. *Kulak Burun Bogaz Ihtis Derg* 2009, 19:57–61
- FITZGERALD DA. Human swine influenza A [H1N1]: Practical advice for clinicians early in the pandemic. *Paediatr Respir Rev* 2009, 10:154–158
- WIWANITKIT V. Antiviral drug treatment for emerging swine flu. *Clin Ter* 2009, 160:243–245
- OSEI-BIMPONG A, JURY C, McLEAN R, LEWIS SM. Point-of-care method for total white cell count: An evaluation of the HemoCue WBC device. *Int J Lab Hematol* 2009, 31:657–664
- KAYABA H. Rapid detection tests for viruses available in pediatric clinics. *Rinsho Byori* 2002, 50:1047–1054
- CHAN KH, LAI ST, POON LL, GUAN Y, YUEN KY, PEIRIS JS. Analytical sensitivity of rapid influenza antigen detection tests for swine-origin influenza virus (H1N1). *J Clin Virol* 2009, 45:205–207
- VASOO S, STEVENS J, SINGH K. Rapid antigen tests for diagnosis of pandemic (swine) influenza A/H1N1. *Clin Infect Dis* 2009, 49:1090–1093
- HURT AC, BAAS C, DENG YM, ROBERTS S, KELSO A, BARR IG. Performance of influenza rapid point-of-care tests in the detection of swine lineage A(H1N1) influenza viruses. *Influenza Other Respi Viruses* 2009, 3:171–176
- IYER SB, GERBER MA, POMERANTZ WJ, MORTENSEN JE, RUDDY RM. Effect of point-of-care influenza testing on management of febrile children. *Acad Emerg Med* 2006, 13:1259–1268
- KOST GJ, HALE KN, BROCK TK, LOUIE RF, GENTILE NL, KITANO TK ET AL. Point-of-care testing for disasters: Needs assessment, strategic planning, and future design. *Clin Lab Med* 2009, 29:583–605
- LOUIE RF, KITANO T, BROCK TK, DERLET R, KOST GJ. Point-of-care testing for pandemic influenza and biothreats. *Disaster Med Public Health Prep* 2009 [Epub ahead of print]

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