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Pandemic phase level 4: human cases of the novel influenza A/H1N1 strain confirmed in Scotland and Spain

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Due to the spread of the ongoing international outbreak of infections with a novel influenza A(H1N1) virus (the so-called 'swine flu'), the WHO raised the alert level for pandemic influenza to Phase 4 on 27 April 2009. The first cases have been laboratory-confirmed on European territory, two in Spain and two in Scotland.

The current outbreak is thought to have started in mid-March of this year, with human cases of the novel influenza virus detected in Mexico and the United States (US). As of today, 28 April, 40 confirmed cases have been reported from five different states in the US, six from Canada as well as 33 from Mexico including five deaths [1-3].

Spain

On 27 April, the Spanish Ministry of Health confirmed the first human case in a patient presenting with mild influenza-like symptoms after returning from Mexico. The patient, a young male, is currently hospitalised for purposes of isolation and treated with oseltamivir. Twenty close contacts of this patient are currently quarantined in their homes, under prophylactic treatment with oseltamivir and actively followed by the Spanish public health services.

A second case was confirmed in Spain on 28 April. The patient is a young adult from Valencia (province). The clinical presentation was mild and the patient is recovering. He had been vaccinated against seasonal influenza in the six months prior to disease onset and did not report contact to infected animals nor to any other confirmed human cases.

This patient developed symptoms on 21 April, one day prior to his return from a trip to Mexico. He had been travelling as part of a larger group of students that also included the first confirmed Spanish case. All passengers on the same flight as the two confirmed cases have been traced and are receiving oseltamivir prophylaxis.

Scotland

On 27 April, two cases of the novel influenza A(H1N1) were confirmed in individuals in Scotland, United Kingdom, who had returned on 21 April from travelling to Mexico [4,5]. They were hospitalised with mild influenza-like symptoms and are now recovering. Currently, 22 close contacts of the two cases are being monitored, seven of whom have developed mild symptoms and are being tested.

The number of countries that have suspected cases under investigation is growing rapidly. Currently it is nine countries in the European Union (EU), the Czech Republic, Denmark, Germany, Greece, Ireland, Italy, Poland, Spain and the United Kingdom, as well as 13 non-EU countries.

Most of the confirmed cases in the US, Canada and all of the confirmed cases in Europe have a history of travel to Mexico. The course of disease is mild in all cases diagnosed in the US and Europe, no related deaths have been reported in these areas. While it is usually the very young and the very old who are affected most by influenza, the majority of cases in Mexico were otherwise healthy young adults. However, this may reflect a bias. The large majority of the more than 1,600 suspected infections in Mexico have not yet been laboratory-confirmed and may therefore not necessarily be related to the novel influenza A(H1N1) strain. A statement on whether the new strain targets a particular age or population group more than others is therefore not possible at this stage.

Strain characteristics

Viruses isolated from cases in the involved countries have the same genetic pattern. The virus is a new reassorted strain that carries a novel combination of gene segments from human, swine and avian influenza viruses and that has not been previously detected in pigs or humans. The genomic sequence of the strain have been made available by the World Health Organization (WHO); accession numbers to the sequence have been published on 25 April: http://www.who.int/csr/disease/swineflu/swineflu_genesequences_20090425.pdf

The virus can be transmitted from human to human and is resistant to amantadanes, but susceptible to neuraminidase inhibitors.

The degree of possible protection by seasonal influenza vaccination is currently under investigation by a research team in the US.

Public health measures

Pandemic phase 4 has implications for the affected countries such as the activation of national pandemic contingency plans, enhanced surveillance, characterisation and sharing of samples and sending regular updates on the situation to WHO [6]. The situation is of concern due to the fact that the virus is transmitted

from human to human and has already spread over considerable geographical distance among an immunologically naïve population.

All suspected cases should be investigated and samples sent for confirmation to a reference laboratory that is equipped to identify the new strain, which should be handled under BSL3 conditions. The novel influenza A(H1N1) strain will appear as non-subtypeable with the standard diagnostic tests. A guidance document for influenza laboratories is available from the WHO website: http://www.who.int/csr/disease/swineflu/swineflu_guidance_labs_20090425.pdf

A diagnostic kit approved by the US Food and Drug Administration and containing oligonucleotide primers for unambiguous identification of the current outbreak strain will be shared with reference laboratories in the EU shortly.

Information specific to the situation in Europe is updated daily on the ECDC website: www.ecdc.europa.eu

Aknowledgements

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Editorials

The global impact of hand hygiene campaigning

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Improving and sustaining hand hygiene is a long-term challenge, as those who are already involved in efforts of improvement are aware. Strategies need to be applied on many levels and include training and the change of behaviour and culture. These strategies take many years to implement and embed within healthcare settings. On 5 May, the World Health Organization (WHO) highlights the importance of hand hygiene and launches guidelines and tools on hand hygiene, based on the next phase of a patient safety work programme 'Save LIVES: Clean Your Hands'.

Since 2005, the WHO 'First Global Patient Safety Challenge' has aimed to promote and support a multimodal improvement strategy for hand hygiene, as Magiorakos et al. highlight in the opening of their paper on national hand hygiene campaigns in Europe, 2000-2009, published in this issue of Eurosurveillance [1].

The first phase of the 'Clean Care is Safer Care', patient safety work programme (2005-2008) saw the following initiatives under the 'First Global Patient Safety Challenge' come to fruition:

- Some 120 countries have pledged to address healthcare-associated infection through cleaner, safer care. Many of these have undertaken a range of activities since pledging;
- The 'Advanced Draft Guidelines on Hand Hygiene in Health Care', published in 2006 [2] and a suite of implementation tools have been developed and tested. This included support for eight pilot sites and over 300 additional, complementary test sites as well as a review of the current evidence and the involvement of a core group of international experts. The finalised guidelines are designed to present WHO member states and all professionals in the infection control specialty with evidence-based direction on how to improve hand hygiene compliance in the short, medium and long term. They also aim to direct on how to prevent infections and reduce the burden of clinical disease, to which poor hand hygiene contributes;
- Global awareness was raised regarding healthcare-associated infections and how the implementation of multimodal improvement strategies can contribute to their reduction;
- The creation of a global network of campaigning nations has been supported in order to share knowledge and build solidarity between those committed to improving hand hygiene in healthcare facilities.

"National programmes do not necessarily employ campaign approaches; however, national health improvement programmes have been shown in many cases to use elements of campaigning and mass media involvement to good effect" [3]. Other recent healthcare campaigns with demonstrable success, have focused not only on hand hygiene but have also included for example, prudent use of antibiotics [4].

The 'First Global Patient Safety Challenge' has, over the last three years, attempted to track the activities of national campaigns. It is encouraging to observe Magiorakos et al. additionally acknowledging the importance and value of undertaking such activities and being in communication with those in their regions who are actively working on hand hygiene improvement.

In 2007, WHO conducted its first survey and meeting of campaigning nations. Seventeen countries reported to be undertaking 20 national or sub-national campaigns [5]. In 2009, a similar survey was conducted and a total of 38 nations and sub-nations with campaigns have been recorded. Those with responsibility for leading these campaigns have been identified and information has also been gathered on whether these campaigns are 'stand alone' or part of wider healthcare associated activities and work programmes. A report of the 2009 survey will be published in the coming months.

Magiorakos et al. note that activities have taken place irrespective of whether the countries had already pledged to WHO to reduce healthcare-associated infections through cleaner safer care or not. Their article adds to the current body of knowledge on such activities. It is also important to note that 70% of campaign coordinators acknowledge the importance of the WHO pledge as a catalyst, and 89% and 73%, respectively, state that the WHO guidelines and implementation tools for hand hygiene improvement are used as a reference (WHO, unpublished data). However, the 'First Global Patient Safety Challenge' recognised at an early stage that pledging and other publicised activities do not always lead to action at the point of care. In addition, national campaigns, once started, do not always continue.

A WHO Patient Safety 2009 initiative has been established to catalyse progress and to further move action from pledging to the point of patient care. This will be the next phase of the 'First Challenge's work on Clean Care is Safer Care' [6].

This initiative 'SAVE LIVES: Clean Your Hands' has, as of April 2009, seen a total of 3,863 healthcare facilities registering their interest and commitment, which equates to a combined staff of over 3.6 million people. The healthcare facilities are based in different countries and territories and represent an increasing level of engagement in the global push to highlight hand hygiene as one of the best ways of reducing healthcare-associated infections.

On 5 May, 2009:

- WHO 'Guidelines on Hand Hygiene in Health Care' will be formally launched. The guidelines feature the steps required for a national strategy for action on hand hygiene improvement;
- The revised 'Guide to Implementation' and an associated toolkit will also be launched
- The revised web pages featuring a wide range of updated information that should support all those campaigning for improved hand hygiene will go live.

Government pledging, and at times associated funding, as described for some of the countries in the article by Magiorakos *et al*. [1], continues to have its place. On 5 May 2009, France will become the most recent country to sign the WHO pledge.

Moving forward, WHO's 'First Global Patient Safety Challenge' aims to publish a range of scientific articles featuring data from the activities at the collaborative pilot sites in each of the WHO regions. In addition, it intends to present an overview of these data at a patient safety event in London on 15 December 2009. The 'First Challenge' team also aims to continue to promote and support the 'SAVE LIVES: Clean Your Hands' initiative on 5 May every year. The vision for this annual event is that each country and where appropriate each healthcare facility, would present and celebrate their advances in hand hygiene improvement and the impact that this had on reducing the burden of disease attributable to healthcare-associated infections. At the same time, overview and country-specific articles such as the one by Magiorakos *et al*., would be truly valuable and add to the evidence base of infection prevention and control.

Sustainability of hand hygiene compliance is a long way off. Working collaboratively both locally and globally will ensure that lessons can be learned and the best efforts can be made to save lives through clean hands.

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The origin of the recent swine influenza A(H1N1) virus infecting humans

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Preliminary analysis of the genome of the new H1N1 influenza A virus responsible for the current pandemic indicates that all genetic segments are related closest to those of common swine influenza viruses.

A new H1N1 influenza A virus has been identified in Mexico, and has spread rapidly to other regions around the world. The World Health Organization in collaboration with many other national and international agencies is working efficiently to evaluate, diagnose and implement measures to contain the spread of this virus. Among the many efforts is the timely release of the genomic sequences from different viral isolates [1]. This is allowing thousands of scientists to participate in the endeavour.

There have been some questions raised about the origin of the new strain. Influenza A is a single stranded RNA virus with eight different segments. When two viruses co-infect the same cell, new viruses can be produced that contain segments from both parental strains.

By using sequences collected in public databases, we can identify the closest relatives of the new strain found in Mexico, and construct clusters and phylogenetic trees. Sequence alignment and similarity, cluster analyses by principal component analysis and phylogenetic tree all point to similar results.

Our preliminary analyses show that the closest relatives to this new strain are found in swine, and occasionally in turkeys. Six segments of the virus are related to swine viruses from North America and the other two (NA and M) from swine viruses isolated in Europe/Asia. The closest clusters (for the HA segment) in the NCBI data base are North America swine influenza A(H1N2) and H3N2s. The closest relatives of the neuraminidase (NA) gene of the new virus, are influenza A isolates from 1992. As more data becomes accessible, the evolution of this gene could be clarified.

The North American ancestors are related to the multiple reassortants, H1N2 and H3N2 swine viruses isolated in North America since 1998 [2,3]. In particular, the swine H3N2 isolates from 1998 were a triple reassortment of human, swine and avian origin.

Therefore, this preliminary analysis suggests at least two swine ancestors to the current H1N1, one of them related to the triple reassortant viruses isolated in North America in 1998. So far, the new strain has not been reported in pigs. It is not clear if this is due to insufficient surveillance of the swine population, or if this virus has been generated in a very recent reassortment event.

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Outbreak of Clostridium difficile 027 infection in Vienna, Austria 2008-2009

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From November 2008 to 15 April 2009, 36 isolates of CD027 were identified in Austria, all originating from four hospitals in Vienna. All isolates were positive for toxin A, toxin B and the binary toxin, and showed a characteristic 18 bp deletion in the *tcdC* gene.

Clostridium difficile is an anaerobic spore-forming bacterium. Some strains may cause diarrhoea due to formation of toxins. Symptomatic *C. difficile* infection (CDI) is primarily linked with hospital admission and antibiotic treatment, although antibiotic exposure is neither necessary nor sufficient for CDI [1,2]. In Belgium, for instance, one third of CDI cases reported in the hospital surveillance system are not hospital-associated [3]. Symptoms range from mild diarrhoea to serious manifestations such as pseudomembranous colitis, toxic megacolon or perforation of the colon. *C. difficile* challenges hygiene standards as it forms spores. The risk of infection rises with increasing age, underlying disease and immunodeficiency [4].

In recent years, a particularly virulent strain, ribotype 027 (CD027), has emerged in a number of countries, particularly in connection with hospital outbreaks, but also in community-acquired diarrhoea cases [5]. The risk of serious disease and death associated with CD027 exceeds that of other *C. difficile* strains. The classical CD027 is characterised – among other things – by an increased production of toxins A and B, production of a binary toxin and resistance to newer fluoroquinolones such as moxifloxacin. The first three Austrian cases of CD027 occurred in 2006 and in March 2008 [6,7].

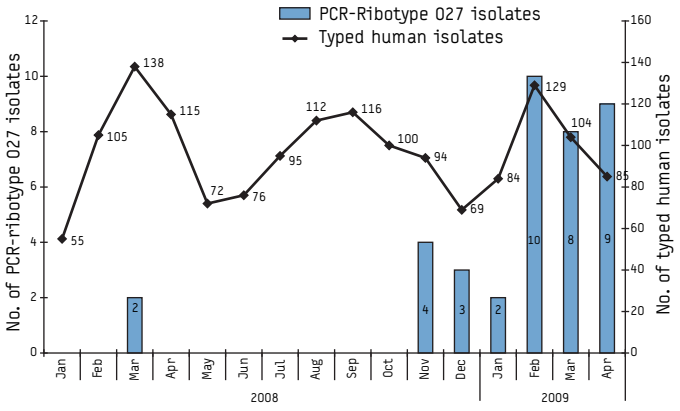
Since August 2006, the Austrian National Reference Centre for *C. difficile* has ribotyped approximately 2,700 human *C. difficile* isolates received from all nine Austrian provinces. In recent months, a drastic increase in CD027 cases has been noted, all originating from four hospitals in Vienna. From November 2008 to 15 April 2009, 36 isolates of CD027 were received at the National Reference Centre. The Figure summarises these *C. difficile* 027 cases by month of reception of the sample at the reference centre.

In contrast to the two isolates from March 2008, which were susceptible to fluoroquinolones, all 36 CD027-isolates cultured since November 2008 showed *in vitro* resistance against moxifloxacin. Five of the 36 isolates also showed in vitro resistance against clindamycin (with minimum inhibitory concentrations (MIC) of ≥256 µg/ml), 14 of the 32 isolates showed intermediate susceptibility for clindamycin (MICs of 4 µg/ml), and 13 isolates were susceptible (MICs of 2 µg/ml). All isolates were positive for toxin A, toxin B and the binary toxin, and showed a characteristic 18 bp deletion in the *tcdC* gene. For 28 of 36 recent PCR-ribotype 027 cases basic demographic data were available. Of those, 17 were female and the median age was 80 years (range: 60-97 years). At least four of the 28 cases were fatal.

CDI is not a reportable disease in Austria. Hospital discharge data indicate a significant increase of CDI during the last years, from 777 cases (54 deaths) in 2003 to 997 cases (80 deaths) in 2004, 1,453 cases (88 deaths) in 2005, 2,192 cases (150 deaths) in 2006, and 2,761 cases (219 deaths) in 2007. While the increase in incidence of CDI in Austria over the last years is not due to CD027, the Austrian Agency for Health and Food Safety has nevertheless advised hospitals to intensify the monitoring of CDI. Increased attention should be given to possible cases of nosocomial diarrhoea, particularly after antibiotic treatment. Clinical microbiology departments are asked to submit isolates from all cases with severe manifestations and on suspicion of an outbreak.

Figure

***Clostridium difficile* cases of ribotype 027, by month of reception of the sample at the reference centre, Austria 2008-2009 (n=38*)**



*Including two isolates from March 2008 [7].

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National Hand Hygiene Campaigns in Europe, 2000-2009

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Hand hygiene represents the single most effective way to prevent healthcare-associated infections. The World Health Organization, as part of its First Global Patient Safety Challenge, recommends implementation of multi-faceted strategies to increase compliance with hand hygiene. A questionnaire was sent by the European Centre for Disease Prevention and Control to 30 European countries, regarding the availability and organisation of their national hand hygiene campaigns. All countries responded. Thirteen countries had organised at least one national campaign during the period 2000-2009 and three countries were in the process of organising a national campaign. Although the remaining countries did not have a national campaign, several reported regional and local hand hygiene activities or educational resources on national websites.

Introduction

Healthcare-associated infections (HCAI) are estimated to affect 1.4 million people worldwide, causing longer hospital stay, increasing hospital costs and excess mortality [1-3]. HCAI are preventable and hand hygiene has been shown to be the single most effective way to prevent cross-transmission of microorganisms and

protect patients from HCAI [4,5]. Compliance with hand hygiene amongst healthcare workers (HCW) has been demonstrated to be quite low, however and are estimated to be around 40% [6,7].

In 2005, the World Health Organization (WHO) introduced the First Global Patient Safety Challenge, 'Clean Care is Safer Care', as part of its World Alliance for Patient Safety, among other things emphasising the importance of hand hygiene. Ministries of Health from around the world pledge their support to take actions to reduce HCAI in their countries. One of the five elements of the challenge that each country promises to implement, is to develop campaigns or actions at a national or international level and to promote and improve hand hygiene amongst HCW [8,9].

Multimodal strategies have been shown to be more successful in improving rates of adherence with hand hygiene in HCW than single interventions, which rarely result in sustained improvement [10-12]. Targeted, multi-faceted approaches focusing on system change, administrative support, availability of alcohol-based hand rubs (ABHR), training and education of HCW, and reminders in the workplace are recommended strategies for improvement [3,13,14]. This report is an overview of the national hand hygiene campaigns, but also regional activities, implemented in Europe since 2000.

Methods

On 6 March 2009 a questionnaire was sent via e-mail by the European Centre for Disease Prevention and Control (ECDC) to the national contacts for surveillance of HCAI of all 27 European Union Member States, as well as to Iceland, Liechtenstein and Norway. An e-mail reminder was sent on 20 March 2009. Our primary question was whether there had been any national hand hygiene campaigns in the country since 2000, but information was also collected on regional campaigns. Our queries were related to the availability of educational, training and media activities for HCW and patients, which types of supporting bodies were involved, and whether the campaign was evaluated and compliance was assessed.

Results

All 30 countries responded to the questionnaire. Thirteen countries had had a national hand hygiene campaign during the period 2000-2009 and three additional countries were in the process of organising a national campaign in 2009. Ten countries did not report having had national campaigns, but had regional campaigns which included hospital-based activities. Only four countries reported no hand hygiene activities on a national or a

Table 1

Summary of campaign and educational activities, supporting bodies and benchmarking activities in 13 European countries that had national hand hygiene campaigns in 2000-2009

Country	National activities							Campaign materials				Government support		Other Support			Benchmarking			
	National campaign	Press conference	Press release	Television spot	Leaflets	Posters	Other	Dedicated website	Material for HCW[a]	Training for HCW	Material for patients	Political support	Financial support	Non-governmental organisations	Pharmaceutical companies (including ABHR[b] manufacturers)	National support for tracking ABHR consumption	Increased availability of ABHR	National support for auditing compliance with hand hygiene in hospitals	Data on compliance with hand hygiene and its improvement with campaign	Data on usage of ABHR
Belgium	•	•	•		•	•	•	•	•	•	•	•	•	•		•	•	•	•	•
Bulgaria	•		•	•		•	•		•	•		•	•	•	•					
Cyprus	•		•		•	•	•		•	•	•		•							
France	•	•	•		•	•	•	•	•	•	•	•			•	•		•		
Germany	•	•			•	•	•	•	•	•	•	•	•	•	•		•	•		
Ireland	•		•	•	•	•	•		•		•		•			•		•		
Italy	•				•	•	•	•	•	•			•				•	•		•
Malta	•	•	•		•	•	•		•	•		•	•			•	•	•	•	•
Portugal	•		•		•	•	•	•	•	•		•	•	•		•		•		
Romania	•					•			•				•	•			•			
Spain	•	•	•		•	•		•	•	•		•	•			•	•	•	•	•
United Kingdom	•		•		•	•	•	•	•		•	•	•	•	•	•	•		•	•
Norway	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•			•

[a]HCW: healthcare workers;
[b]ABHR: alcohol-based hand rubs.

regional scale. Detailed results are presented below and in Table 1. Internet addresses of national campaigns and other national educational resources on hand hygiene are compiled in Table 2.

Belgium

Belgium has had three national hand hygiene campaigns, all called 'You Are in Good Hands', in 2005-6, 2006-7 and 2008-9. More than 90% of acute care hospitals participated in these campaigns. The last two campaigns also targeted chronic care and other specialised institutions. Support form governmental and non-governmental organisations (NGO) was available for all campaigns, which included a press conference held by the Minister of Health, press releases, coverage through television programmes, leaflets, posters and a dedicated website containing downloadable training material for HCW and promotional material and protocols for measuring how compliant HCW were with hand hygiene (www.hicplatform.be). A special protocol and software were developed to enter hand hygiene compliance data; these data were sent to the national surveillance institute for analysis and benchmarking. A web-based quiz on hand hygiene for HCW was available in 2006 and 2008 (http://www2.iph.fgov.be/handhy/) and quiz scores were analysed at the national level and benchmarked between hospitals. There was an increase of ABHR use and in hand hygiene compliance during all three campaigns. Institutional results from observations, questionnaires and quiz scores were returned to individual hospitals for feedback. Feedback reports included hospital compliance with 95% confidence intervals, position of the hospital in the national distribution, national results and indicators stratified by professional group, type of ward, type of contact in accordance with the five WHO indicators of hand hygiene, and by hospital unit. Data from 2005-6 on hand hygiene compliance and ABHR consumption in Belgium have been published by Simon et al. [15] and Goossens et al. [16]. A detailed report of the first two campaigns has been submitted for publication and data from 2008-9 are currently being collected.

Bulgaria

'Hand Hygiene - What Do We Know' was the name of the national Bulgarian hand hygiene campaign, which took place from 2004 to 2006. Support was available from the government, from the 'Swiss-Bulgarian Programme for Hospital Hygiene', as well as from pharmaceutical companies including manufacturers of ABHR. Targeting HCW, the campaign involved press releases and posters, multicentre questionnaire studies, training programmes on a national scale, lectures during training periods and invited speakers from other countries. No data is currently available for auditing of compliance with hand hygiene or consumption of ABHR.

Cyprus

Cyprus had two national, one-week campaigns called 'Hand Hygiene Week' in 2007 and 'Did You Wash Your Hands?' in 2008. Both campaigns were organised by the National Infection Control Committee and the Infection Control Nurses Committee. The campaigns included press releases, leaflets, seminars and posters for the public and for HCW. National training programmes and on-site clinical training on hand hygiene were offered for HCW. Free leaflets and posters as well as stations with information about infection control were available at the entrances of the hospital. Stickers were distributed widely, and children in paediatric units used painting as a means to learn about hand hygiene. The availability of ABHR in hospitals was increased. Financial support from the government was available for the campaign and for auditing of compliance, but there was no national support for measuring consumption of ABHR.

Table 2

Internet addresses of national campaigns and other educational resources on hand hygiene in Europe

Country	Campaign web address
Belgium	www.hicplatform.be
Denmark	www.ssi.dk/hygiene
Finland	www.sshy.fi/
France	www.sante-sports.gouv.fr/dossiers/sante/mission-mains-propres/mission-mains-propres.html
Germany	www.aktion-sauberehaende.de
Italy	www.ccm-network.it/node/85
The Netherlands	www.handhygieneredtlevens.nl
	www.gewoonhandenschoon.nl
Norway	www.renomsorg.no
Portugal	www.dgs.pt (click on 'Microsite do Controlo da Infecção')
Spain	www.seguretatpacient.org/cms/index.php?id=95&L=2
	www.seguridaddelpaciente.es
	www.juntadeandalucia.es/agenciadecalidadsanitaria/observatorioseguridadpaciente/gestor/sites/PortalObservatorio/es/menu/practicasSeguras/Prevencion_de_la_infeccion_asociada_a_la_atencion_sanitaria/
United Kingdom	England and Wales www.npsa.nhs.uk/cleanyourhands/
	Northern Ireland www.dhsspsni.gov.uk/cleanyourhands
	Scotland www.washyourhandsofthem.com www.hps.scot.nhs.uk/haiic/ic/nationalhandhygienecampaign.aspx

France

On 23 May 2008, France had a national campaign for hand hygiene called 'Mission clean hands'. An estimated 140,000 people participated. Press conferences, press releases, television programmes, leaflets, posters, and a stand at the exhibition 'Hôpital Expo 2008' (www.hopitalexpo.com) were organised, and a dedicated campaign website was created (http://www.sante-sports.gouv.fr/dossiers/sante/mission-mains-propres/mission-mains-propres.html). HCW were offered training programmes on a national scale including movie clips (http://www.sante-sports.gouv.fr/dossiers/sante/mission-mains-propres/outils-campagne/clips.html), a slideshow (http://www.sante-sports.gouv.fr/dossiers/sante/mission-mains-propres/outils-campagne/diaporama.html) and a self-evaluation quiz (http://www.sante-sports.gouv.fr/dossiers/sante/mission-mains-propres/testez-vos-connaissances/quizz-campagne.html). Patients were targeted by leaflets, posters, websites and a hotline telephone number where they could obtain information on HCAI. Governmental support was available, as well as support from NGOs and pharmaceutical companies, including manufacturers of ABHR. National aid was also given for auditing of compliance with hand hygiene and measuring consumption of ABHR. Data on auditing can be downloaded from: http://www.grephh.fr/telechargement/mains_guidemethodologique.pdf. Results regarding increased availability of ABHR, consumption of ABHR as well as compliance with hand hygiene will be available in July 2009. Results prior to 2007 can be downloaded from: http://www.sante.gouv.fr/htm/dossiers/nosoco/tab_bord/documents/rapport2007.pdf.

Germany

'ACTION Clean Hands' is a national campaign that has been ongoing since January 2008 with plans to last until December 2010. Campaign media activities included press conferences, leaflets, posters, comics, an introductory course book, e-learning tools and a dedicated website (www.aktion-sauberehaende.de). Activities targeting HCW included training programmes on a national scale and a national campaign day held on 22 October 2008. Governmental support was available, as well as from many NGOs and pharmaceutical companies, including those manufacturing ABHR. National support for tracking consumption of ABHR and for auditing of compliance with hand hygiene was also available. Baseline data on ABHR consumption and compliance with hand hygiene were collected up to the time of our survey and follow-up data are expected.

Ireland

In 2006-7, Ireland organised a national campaign called 'Clean Hands Save Lives'. Its media involvement included press releases, television programmes, leaflets, posters, radio and print advertising. Hand hygiene resources for acute hospitals were included as an element of national hospital hygiene standards and subsequent external audits. No national training programme was available for HCW, but posters, e-learning programmes on hand hygiene, and a DVD on standard precautions were offered. Patients were targeted by posters and television advertising, urging them to take an active role in their health by reminding HCW to wash their hands. Financial governmental support came from the Health Service Executive and there was national support for auditing of compliance with hand hygiene practices and measuring consumption of ABHR. A significant increase in ABHR consumption was observed from 2006 to 2008 (http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/Handwashing/Publications/).

Italy

A national campaign called 'Clean Care is Safer Care' took place in Italy in 2007-8. Media activities for HCW included leaflets, posters and a dedicated website (http://www.ccm-network.it/node/85). In order to further increase awareness of hand hygiene, hand microbiological sampling was offered in some hospitals. Increased availability of ABHR was observed in hospitals. Financial support from the government was available, as was national support for auditing compliance with hand hygiene practices and for tracking ABHR consumption. As part of a WHO-selected and funded pilot site, a network comprising 41 intensive care units is collecting data on rates of HCAI before and after the national hand hygiene campaign. Preliminary, but unpublished data on how compliance improved during the campaign have been collected.

Malta

A national campaign called 'Stop, Rub & Go' was launched in October 2008. Activities included press conferences, press releases, leaflets, posters and newspaper articles. Hand hygiene training on a national scale and on the ward level as well as seminars were available for HCW. This campaign was supported by the government and national support was also available for auditing compliance and measuring availability and consumption of ABHR.

Norway

A national campaign called 'Pure consideration' was organised in Norway in 2005. To better promote it, a professional advertising company was hired and press conferences, press releases, leaflets, posters and a dedicated website (www.renomsorg.no) were part of the framework of the campaign. Training programmes for HCW were offered on a national scale, and training and teaching material was distributed to local campaign leaders. Prior to the campaign, focus groups targeting hospital managers and HCW were organised and new national guidelines on hand hygiene were published. Governmental support was available, but there was no support for tracking consumption of ABHR. Other local activities were funded by the healthcare institutions themselves. There was increased availability of ABHR and national sales figures of ABHR tripled after the campaign(http://www.fhi.no/eway/default.aspxpid=233&trg=MainLeft_5565&MainArea_5661=5565:0:15,3424:1:0:0:::0:0&MainLeft_5565=5544:61110::1:5569:3:::0:0). A detailed self-evaluation of the campaign is available in Norwegian at: http://www.fhi.no/dav/4F85451BCA.pdf.

Portugal

A national campaign in Portugal called 'Hand Hygiene, a Shared Responsibility' began in October 2008 with plans to continue until March 2010. This campaign is based on two cornerstones: HCW training and awareness and education at the hospital level. General media activities include leaflets, posters, press releases and a dedicated website (www.dgs.pt and click on 'Microsite do Controlo da Infecção'). HCW are trained by national and hospital training programmes. A web-based programme is available that offers data collection questionnaires created by the WHO facilitating data generation on hand hygiene compliance and consumption of ABHR. Political and financial support is available from the government and from a health sector NGO. National support for auditing of hand hygiene compliance and for measuring consumption of ABHR will be provided in 2009, increased availability of ABHR will start in 2010 and data on compliance with hand hygiene and consumption of ABHR will be available in 2010.

Romania

A national campaign called 'Universal Precaution' was organised in Romania in 2007. This campaign was supported politically by the government and by an NGO, the Global Fund. Regular training sessions about hand hygiene had already been a part of each hospital's hand hygiene plan and were continued throughout the campaign.

Spain

National campaigns called 'Clean Hands Save Lives' with regional adaptations have been held since 2006 in Spain, initially targeting HCW and currently also the public. Spain pledged its support to the First Global Patient Safety Challenge in 2006, and since 2005 specific funds have been provided to health regions by the Ministry of Health. The design and implementation of the different activities was initially carried out at regional level, and currently a national coordination group has taken the lead. Training programmes for HCW are available on a national scale, not only through media and relevant websites, but mainly through educational activities. Political and financial governmental support is available, as is national support for auditing of compliance of hand hygiene and measuring the consumption of ABHR. There is increased availability of ABHR. Initial data on compliance with hand hygiene have been published [17,18]. Relevant campaign website addresses are shown in Table 2.

United Kingdom

In 2004, the National Patient Safety Agency (NPSA), initiated the 'cleanyourhands Campaign' within the National Health Service (NHS) in England and Wales (www.npsa.nhs.uk/cleanyourhands/). There are plans to continue the campaign until 2010. Funding for the campaign comes from the Government with additional support from suppliers of hand hygiene products. The campaign is supported by additional organisations including the NHS Purchasing and Supply Agency (now NHS Supply Chain) and the Infection Control Nurses Association (now the Infection Prevention Society). The campaign targets HCW with the provision of ABHR at the point of care, posters, press releases, leaflets, education and training resources, and its dedicated website. Involving patients is also part of the campaign, with some materials featuring the message 'It's OK to Ask'. In 2009, a series of training workshops on the WHO 'Five Moments for Hand Hygiene' (http://www.who.int/gpsc/tools/Five_moments/en/index.html) are taking place, supported also by other resources including a DVD. A pilot project has been started, designed to empower patients to improve compliance of HCW with hand hygiene. Data on compliance with hand hygiene and on consumption of ABHR can be downloaded from: www.idrn.org/nosec.php.

In 2008, the Department of Health Social Services and Public Safety in Northern Ireland linked with the NPSA and launched the 'cleanyourhands Campaign' (www.dhsspsni.gov.uk/cleanyourhands).

In Scotland, the hand hygiene campaign 'Germs. Wash your hands of them' (www.washyourhandsofthem.com) was launched in 2007 by Health Protection Scotland (HPS). An audit tool and supporting protocol are used by Scotland's 14 NHS Boards, and data for hand hygiene compliance from all NHS Boards is reported quarterly and can be downloaded from: http://www.hps.scot.nhs.uk/haiic/ic/nationalhandhygienecampaign.aspx. Previous targets for compliance set by the Scottish government have been met and exceeded, and now a zero tolerance approach is being taken by all NHS Boards towards non-compliance with hand hygiene.

Countries that are currently preparing a national campaign

Austria has not yet had any national campaigns, but is planning to organise one in the course of 2009. Activities of this upcoming campaign will include press conferences, press releases, leaflets and posters. A separate portion of the campaign will target HCW, and will and will make use of educational modules that are already in place. Websites and other media activities will also be available. Political and financial support is to come from the government, and evaluation of the campaign by feedback and benchmarking is one of its goals.

Greece has not yet had a national campaign, although the Hellenic Centre for Disease Control and Prevention (KEELPNO) is planning a national campaign in the autumn of 2009, entitled 'National Week on Hand Hygiene'. Since 2007 KEELPNO has been supported financially by the government, has been active in distributing hand hygiene guidelines and posters to all hospital infection control committees and in organising hospital lectures regarding hand hygiene. Other measures have included successfully placing ABHR containers on bed rails in most Greek hospitals and posting information for the public and HCW regarding hand hygiene at: http://www.keelpno.gr/articles/topic/?id=379

Luxembourg. No national campaign has taken place yet, but many local hospital-based activities exist. Luxembourg is in the process of preparing a national campaign for 2009, which will be called 'Clean Hands are Safe Hands'. In order to promote awareness, this campaign will include press conferences, press releases, posters and leaflets for HCW, patients and the public. A self-evaluation web-based quiz and pre- and post-campaign compliance evaluation for HCW will also be provided. Governmental and NGO support already exists, and national support for auditing of compliance with hand hygiene and tracking of consumption of ABHR will also be available.

Countries that did not report having had a national campaign

Czech Republic. No national campaign has been held yet, but local hospital campaigns on hand hygiene have taken place. Hand hygiene training programmes have been offered to HCW since 2003 and regional ABHR manufacturing companies have targeted HCW by offering professional support, mostly in the form of lectures and hand hygiene training using ultraviolet lamps. There has been an increase in availability of ABHR in hospitals and in compliance with hand hygiene. Data is available on the consumption of ABHR in Joint Commission International-accredited hospitals, but is not published. A local campaign for HCW and patients was organised in 2008 at the Central Military Hospital in Prague, promoting WHO's 'Clean Care is Safer Care' campaign on the hospital intranet and with leaflets and posters. Hand hygiene guidelines were issued by the Ministry of Health in 2005.

Denmark. No national campaign has been held so far, but individual, hospital-based campaigns exist. In 2008 the National Board of Health and Statens Serum Institut organised a survey of local campaigns, with regard to their design, resource availability and indicators used for compliance evaluation. A educational hand hygiene website (www.ssi.dk/hygiene) was created in 2002 and updated in 2004. It is available for all healthcare institutions to use when they want to create their own local campaigns. Among other information it offers downloadable material and posters for purchase The website has also been translated into English.

Estonia. No national campaign has been organised but, following national infection control standards issued by the Ministry of Social Affairs, the Estonian Society of Infection Control (an NGO) has been offering annual seminars targeting Estonia's 57 hospitals since 2001. Estonia is currently working on implementing a national system for surveillance of HCAI and aims to evaluate hand hygiene compliance in conjunction with rates of HCAI.

Finland. There has not been a national campaign, but many regional and local activities for hand hygiene exist, which are supported financially by the government. These activities include training for HCW, a video on hand hygiene provided by the Finnish Society for Hospital Infection Control and an e-learning course on infection control (http://www.sshy.fi/). In addition, several regional campaigns have taken place in acute care and long-term care facilities, focusing mainly on hand hygiene.

Hungary. No national campaign has been organised so far, but there are local hospital-based hand hygiene activities for HCW.

Iceland. There has been an ongoing regional campaign in Iceland since 2005 called 'Clean Hands Cure the Best', and presentations, leaflets and posters have been used as part of the media activities. No national training programme is offered, but a dedicated website for HCW is available through the Landspitali University hospital. A separate part is dedicated to patients, offering educational leaflets on admission. ABHR are increasingly available in hospitals and data exist on how compliance has improved with this campaign. However, national support for tracking ABHR consumption or compliance with hand hygiene has not been available for this campaign.

Liechtenstein. No national hand hygiene campaign has taken place.

Lithuania. No national hand hygiene campaign has taken place, but local activities exist and as mandated by national guidelines, posters indicating the proper method of hand hygiene are available in all hospitals.

Latvia. No national campaign has been organised yet. Infection control guidelines exist and HCW are given brief teaching sessions on hand hygiene before starting work at hospitals.

The Netherlands. No national campaign has been organised yet, but there have been many active regional campaigns targeting HCW only. These campaigns included media activities such as press releases, television programmes, leaflets and posters as well as a dedicated website (www.handhygieneredtlevens.nl and www.gewoonhandenschoon.nl). Support was available from NGOs, the hospitals themselves and the industry, including pharmaceutical companies and ABHR manufacturing companies. Regional support was available for auditing of compliance with hand hygiene. ABHR were increasingly available in hospitals during the campaigns. Data on consumption of ABHR and on compliance with hand hygiene is available but not yet published.

Poland. No national campaign has taken place since the last campaign in 1998, but local infection control activities exist.

Slovakia. No national campaign has been organised, but local activities have taken place. For example, regional campaigns on hand hygiene for HCW took place in 2007 and 2008. National healthcare exhibitions have held demonstrations about the correct use of ABHR. Legislation was passed in 2007 making hand hygiene mandatory and updating infection control guidelines. Since 2006, educational programmes on hand hygiene have been offered for medical students, nursing students, and HCW. Each regional public health authority in the Slovak Republic was provided with educational presentations for HCW in the region.

Slovenia. No national campaign has been organised. As part of a local campaign, the University Medical Centre (UKC) in Ljubljana has been organising an ongoing hospital-wide campaign since 2000. This campaign consists of leaflets, posters, CD-ROMs, workshops and a dedicated (restricted) intranet website targeting HCW (www.kclj.si/portal_ZN/). All HCW must attend seminars on hand hygiene and exams are mandatory. Patients are targeted by distribution of leaflets in Slovenian and English. availability of ABHR in Slovenia has increased, and its consumption is being tracked at UKC, also in correlation with trends in infection rates of multidrug-resistant bacteria.

Sweden. No national campaign for hand hygiene has been held, but regional campaigns are quite active. Regulations from the National Board of Health and Welfare on hand hygiene exist and implementation of these regulations is organised locally. Educational activities for HCW, local hand hygiene campaigns, measuring hand hygiene compliance and also measuring consumption of ABHR are the main foci of Sweden's local campaigns and practices. Results from a questionnaire sent to HCW and healthcare institutes in 2007 showed poor hand hygiene compliance (www.socialstyrelsen.se/Publicerat/2007/9835/2007-10-103.htm)

Sweden is organising a national project to support infection control and hand hygiene in long-term care facilities.

Discussion

Hand hygiene is an important and essential practice in the field of healthcare, as it reduces the transmission of microorganisms and prevents HCAI. Organising national hand hygiene campaigns is one of the recommended strategies in WHO's First Global Patient Safety Challenge 'Clean Care is Safer Care'.

As of April 2009, 16 of the 30 European countries included in this review had organised or were in the process of putting together national hand hygiene campaigns and several of the remaining countries had regional campaigns. Our intention was to look into the types of hand hygiene activities that currently exist in European countries, at national and regional level. It is apparent that European countries are currently at varied stages of development of national campaigns, ranging from no campaigns at all, to regional activities, to plans for upcoming campaigns and to already elaborately organised campaigns. Some countries that did not have a national campaign, reported active regional campaigns providing significant hand hygiene information and activities.

Hand hygiene campaigns involve processes that work on multiple levels within healthcare systems in order to improve hand hygiene compliance. Targeting relevant groups by education, evaluation and providing feedback are some of the key components of a campaign. Implementation of hand hygiene campaigns requires careful planning, often changes in established beliefs and behaviour, system change and also administrative and/or national support. It would thus have been interesting to compare details about the structure of national and regional campaigns; however, we were unable to obtain detailed information from all countries.

Evaluation of the impact of national or even regional campaigns would require data on compliance with hand hygiene practices,

consumption of ABHR and possibly decrease in HCAI. We attempted to obtain this information, but only some of the countries in this review had collected such data, making it difficult to assess or compare efficacy of campaigns. This is most likely due to the fact that countries are at different stages of the implementation and evaluation of hand hygiene activities.

It is beyond the scope of this article to discuss the likely reasons for differences in the level of implementation of campaigns, as our sole purpose was to document the types of hand hygiene campaign activities that exist in Europe at a national and regional level. We hope that this review will contribute to the exchange of experiences and of information between European countries. We hope that our information can be used as a tool for self-assessment by the individual countries themselves and we anticipate that all countries will continue their efforts to promote hand hygiene in Europe as part of a concerted global strategy to improve patient safety.

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Investigation of the spread of brucellosis among human and animal populations in southeastern Bulgaria, 2007

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Three human cases of brucellosis were reported in summer 2007 in the region of Haskovo in southeastern Bulgaria. Subsequently, the regional veterinary and public health authorities carried out investigations to determine the spread of infection in domestic animals and in the human population. As a result, over 90,000 animals were tested, and 410 were found infected with brucellosis. The screening of 561 people believed to have been at risk of infection yielded 47 positive results. The majority of these persons had direct contact with domestic animals or had consumed unpasteurised dairy products. The investigations revealed evidence of disease among animals in the region and a considerable risk to humans, thus emphasising the need for effective prevention and control programmes.

Introduction

Brucellosis, also called undulant fever or Malta fever, is a zoonotic infection caused by Gram-negative bacteria of the genus *Brucella*. *Brucella melitensis* affects predominantly small ruminants, such as goats and sheep, *B. abortus* is found mainly in cattle and *B. suis* in pigs, whereas *B. canis* occurring in dogs is the least common. Transmission to humans may take place by direct contact with affected animals or their post-partum/post-abortion secretions, by ingestion of contaminated, unpasteurised food (mainly dairy products), and by inhalation of infected aerosols. The potential to infect humans and animals through aerosol exposition has raised the possibility of deliberate use of *Brucella* spp. as a biological weapon [1].

The mean incubation period in humans is 2-10 weeks, but could range from several days up to six months. The symptoms include intermittent fever, chills, asthenia, fatigue, weakness, malaise, arthralgias, low back pain, headache, anorexia. Chronic untreated brucellosis can lead to osteoarticular or, less commonly, genitourinary complications, in some cases even death [2,3].

Globally, brucellosis remains a serious problem, with more than 500,000 cases per year worldwide. In Europe, brucellosis affects mainly the Mediterranean countries, but the epidemiology of this infection has been changing over the past decade due to various sanitary, socioeconomic, and political factors, and to international travel [4]. In 2006, a total of 1,313 human cases, of which 955 were confirmed, were reported in the European Union (EU) countries, representing a notification rate of 0.20 per 100,000. Twelve countries reported zero cases. The highest notification rates per 100,000 were reported by Greece (1.1), Italy (0.78), Portugal (0.72) and Spain (0.3) [5].

In Bulgaria, since 1903, only sporadic cases had been reported in humans. However, during the last few years, the numbers increased; 37 cases were reported in 2005 and 11 in 2006 [6,7]. In 2007, in the course of the investigations described in this paper, 50 cases were identified in the province of Haskovo in southeastern Bulgaria (Figure 1), which brought the total number of cases registered in the country to 57.

The investigations reported here were undertaken after three cases with clinical symptoms and laboratory confirmation of brucellosis had been detected in the town of Harmanli (two cases) and a nearby village of Valche pole (one case) in the Haskovo region. The objectives were to determine the spread of disease in domestic animals, conduct active case-finding in the human population potentially exposed to infection, identify risk factors and provide recommendations for appropriate control and response measures.

Methods

Case investigation

Brucellosis has been a notifiable disease in Bulgaria since 1903. The current case definition is based on the EU case definitions [8] as stated in the 2005 national legislation on registration, notification and reporting of communicable diseases [9].

Cases were interviewed using a standard questionnaire collecting information on the epidemiology and clinical presentation of brucellosis: contact with animals and consumption of unpasteurized dairy products, and possible symptoms, such as malaise, fever, chills, sweats, headache, neck pain, low back pain, joint pain, muscle pain, occasionally diarrhoea, constipation, anorexia, weight loss, and abdominal pain.

Epizootiological study

In the region of residence of the first three reported cases of brucellosis an epizootiological investigation was carried out by the Haskovo regional inspectorate for public health protection and

control (RIOKOZ) and the regional veterinary services (RVMS). Serologic screening of domestic animals – goats, sheep, cattle, horses and donkeys – was carried out in 10 localities: Valche pole village in Ljubimetch municipality, Harmanli town and five villages in Harmanli municipality, Mramor village and Ustrem village in Topolovgrad municipality, and Levka village in Svilengrad municipality. Sera samples were obtained from a total of 90,345 animals. The first animals were screened following the notification of the first case from Valche pole in August 2007. Then the area was broadened to include places inhabited by the two subsequent cases reported in September and the neighbouring localities and the investigations continued with periodic screening performed every three months.

The serologic tests conducted were Rose Bengal and complement binding reaction. The positive samples were sent for confirmation to the reference laboratory for brucellosis in the National Diagnostic Scientific Veterinarian Medical Institute where Rose Bengal, complement binding reaction and ELISA were performed.

Study in the human population

The total population living in the area is 22,335 inhabitants.

We estimated the size of the population exposed to risk of infection, by identifying those who may have had contact with infected animals or consumed products originating from these animals (families living at the farms where cases in animals were detected and their visitors). From the veterinarians who performed the epizootiological study we received information on owners of animals which tested positive for brucellosis. On the basis of this data, a list of farmers whose animals had tested positively for brucellosis was established. To this list, we added their families and friends and relatives who had visited the farm and therefore may have had contact with the infected animals.

In total 561 persons were identified for serologic screening and 581 sera were tested. The serologic investigation was carried out in the laboratory for hazardous infections in the National Center of Infectious and Parasitic Diseases (NCIPD) and in the reference laboratory for brucellosis in the National Diagnostic Scientific Veterinarian Medical Institute.

Three single serologic tests were performed for each person. The samples were accompanied with information about the name, age and place of residence of the contact person. Rose Bengal and Wright tests were carried out for 329 people and Brucellacapt, Rose Bengal and Wright tests were performed for 232 persons.

We also performed a survey using a standard questionnaire collecting information about possible contact with animals and consumption of unpasteurised food products as well as clinical signs and symptoms indicating brucellosis. All 561 persons were surveyed.

Results

Case investigation

In August and September 2007 the regional inspectorate for public health protection and control (RIOKOZ) in Haskovo was notified about three cases of brucellosis in residents of the region – one from village Valche pole and two from the town Harmanli. In all three cases the diagnosis of brucellosis was laboratory-confirmed according to the case definition [7,8]. The disease developed in two women and one man. The data from the extended clinical-epidemiological investigation are as follows:

Case 1

In the end of July 2007, a 62-year-old woman was admitted to hospital in Plovdiv with symptoms of fever, low back pain, urine frequency and dysuria, muscle pains and shivering. The initial diagnosis was pyelonephritis but further tests in August yielded positive result for brucellosis by ELISA. The patient history revealed that the woman lived in the village Valche pole during the spring and summer periods. Her sister's family breeded domestic animals and the patient consumed milk products originating from these animals without preliminary heat treatment. In the course of subsequent epizootiological investigations, four animals from this farm – sheep and goats – tested positive for brucellosis.

Case 2

A man, aged 62 years, presented with symptoms of fever, chills and low back pain in the end of May 2007. The initial diagnosis was pyelonephritis and an outpatient treatment was initiated. In July the patient was again with fever, chills and joint pain. A maculo-papulous rash appeared and he was admitted to the infectious diseases ward in the hospital in Haskovo with diagnosis of Marseilles fever (boutonneuse fever), but the disease was not confirmed serologically. He remained febrile and developed inflammation of the testis and epididymis. On the basis of the patient history – breeding domestic animals and consumption of milk products without the necessary heat treatment – a suspicion of brucellosis was raised and a serological test performed. The results obtained in mid-September were positive.

Later screening of his animals also yielded positive results.

Table

Results of active case-finding among the population at risk of brucellosis infection in Haskovo province in southeastern Bulgaria, 2007

Place of residence	Study population	Number of people who tested positive for brucellosis	Those who tested positive for brucellosis	
			Consumption of milk products without heat treatment	Contact with animals positive for brucellosis
Ljubimetch municipality: Valche pole village	158	5	4	4
Harmanli municipality	243	29	29	20
Topolovgrad municipality: Ustrem and Mramor village	150	13	13	11
Svilengrad municipality: Levka village	10	-	-	-
Total	561	47	46	35

Case 3

A 74-year-old woman, resident of Harmanli, fell ill in September 2007 with fever, gastrointestinal symptoms and loss of weight. In the course of the diagnostic process a positive result for brucellosis was obtained. The patient kept domestic animals – her goats had given birth to dead kids in December 2006 and January 2007. She had consumed milk products without the necessary heat treatment.

Epizootiological investigation

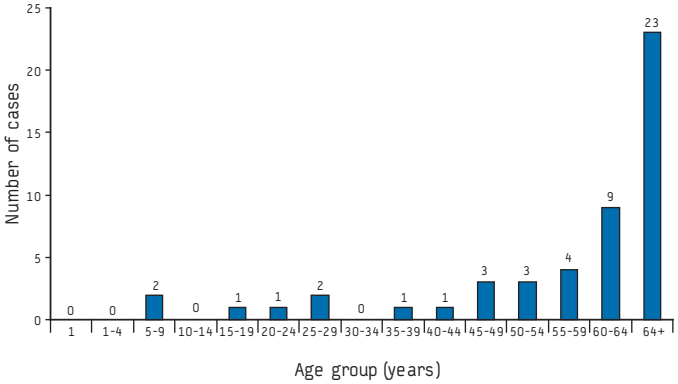
In total, 90,345 animals - goats, sheep, cattle, horses and donkeys – from 10 localities in the region were tested for brucellosis. Of these, 403 small ruminants (sheep and goats) and seven cattle were found infected. During the time of the screening none of the animals had symptoms of the disease, but some of the owners reported miscarriages and stillbirths in their farm animals during the winter and spring of 2007.

FIGURE 1

Map of Haskovo province in southeastern Bulgaria where human and animal cases of brucellosis were detected in 2007

FIGURE 2

Age distribution of human cases of brucellosis in the province of Haskovo, Bulgaria, 2007 (n=50)



As a result, 83 small farms were identified where animals with positive serology for brucellosis had been detected - 16 in Valche pole village (Ljubimetch municipality), 28 in the town of Harmanli, 38 in Mramor village (Toplovgrad municipality) and one in Levka village (Svilengrad municipality). Sporadic cases of infected animals were also detected in the villages Dositeevo, Dripchevo, Ivanovo, Cherna mogila and Nadejden from municipality Harmanli and Ustrem village from municipality Topolovgrad, where individual, small stock breeding farms exist.

Study in the human population

Of the 561 people screened for brucellosis, 47 tested positive. Five of these were residents of village Valche pole, 29 of the town Harmanli and 13 of village Mramor.

All 561 individuals were also interviewed. The survey confirmed that those infected had contact with infected animals or consumed unpasteurised milk products.

The results of these investigations are shown in the Table.

The results of the serological screening indicate that as an outcome of the epizootic process in the region the infection has spread to people: besides the three index cases with manifestation of symptoms, 47 persons with positive serology but without clinical signs and symptoms of the disease were identified.

The majority of these people had contact with infected animals and/or consumed unpasteurised milk products.

Among 158 people tested in village Valche pole in municipality Ljubimetch, five had positive serology. For four of these there was evidence that they had domestic animals in their individual farms that had tested positive for brucellosis and had consumed milk products without the adequate heat treatment. In municipality Harmanli, of the 243 investigated people 29 had positive serology. Of these all reported ingestion of milk products without the necessary heat treatment and 20 had animals that had tested positive. In Topolovgrad municipality, Ustrem and Mramor villages, of the 150 people tested, 13 had positive serology.

The majority of people who tested positive for brucellosis were over the age of 45 years and the largest age group was that of 64 years and older (Figure 2). The small number of cases among children could be explained by the fact that they more rarely than adults have contact with the animals. The proportion of men was 52% (Figure 3).

The majority of persons who tested positive for brucellosis had contact with animals via their occupation, either in individual farms as farmers or herdsmen, or as veterinarians (Figure 4).

Discussion and conclusion

The occurrence of brucellosis in humans is directly linked to the epizootic of animal brucellosis. The sources of infection are domestic animals and known risk factors for the development of the disease are direct contact with animals and consuming of unpasteurized milk and related dairy products [10,11]. The results of the joint investigations in the animal and human population reported here indicated that the spread of brucellosis in the region of Haskovo was notable and that the consumption of unpasteurised dairy products was a widespread common practice among the local population.

The testing of domestic animals followed by the screening of people who may have been at risk of infection proved to be a timely

and adequate response to the detection of the first three human cases in the region, and the collaboration between the veterinary and public health authorities was very good.

Further measures included providing organisational and methodological support to all general practitioners in the region to raise awareness of brucellosis and ensure quick diagnosis and adequate treatment of infected patients. Information on the symptoms of brucellosis and ways of preventing infection was also given to the general public in printed booklets and online material published on the RIOKOZ website.

Brucellosis is a rare disease and physicians may not be aware of the initial clinical symptoms and of the diagnostic procedures necessary for the verification of the disease. Clinical symptoms are not specific and patients may consult different specialists, which results in diagnostic delay. Treatment is difficult because of the intracellular nature of the infection and possibility for chronification. The therapeutic strategies are characterised by long duration and high cost of treatment [12,13].

The events described in this paper emphasize the importance to develop a national programme and response protocol for prevention of brucellosis, and to improve the laboratory diagnostics. It is necessary to define in what intervals the serologic tests of the affected patient should be performed to document the response to therapy and when and who should be screened among the contacts. We also believe that general practitioners should work closely with specialists in infectious diseases in treatment and follow-up of patients with brucellosis.

The results of our epidemiological investigations indicate that control and eradication programmes among animals and proper food safety should be regarded as priority measures in prevention of brucellosis. This is crucial especially considering that there is no human vaccine available.

As a result of the events described here the veterinary authorities have continued the periodic screening of animals performed every three months in the region affected. A special programme regulates the preventive and control measures undertaken in case of brucellosis detected in animals.

Regarding human cases, a questionnaire for patients with brucellosis has been developed at the national level. Training courses have been offered to general practitioners and infectious diseases specialists on etiology, diagnosis and epidemiology of brucellosis.

In 2008, one case of brucellosis with clinical presentation of the disease and 10 asymptomatic cases were notified in Bulgaria.

Figure 3

Sex distribution of human cases of brucellosis in the province of Haskovo, Bulgaria, 2007 (n=50)

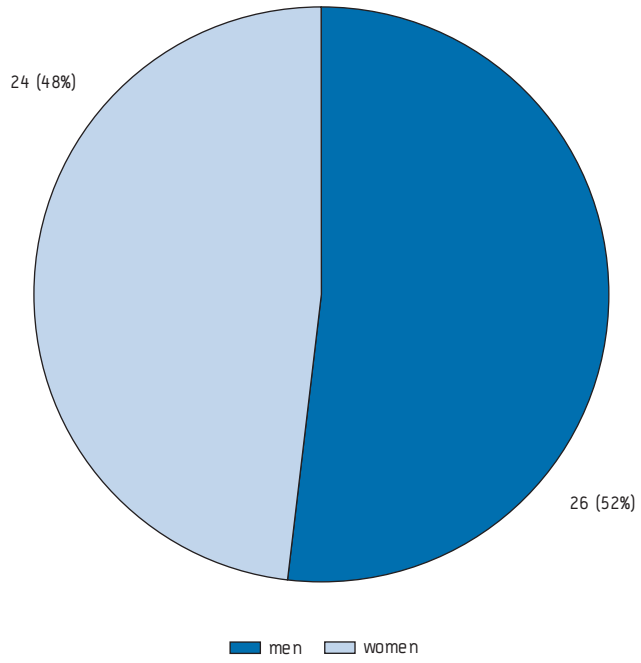
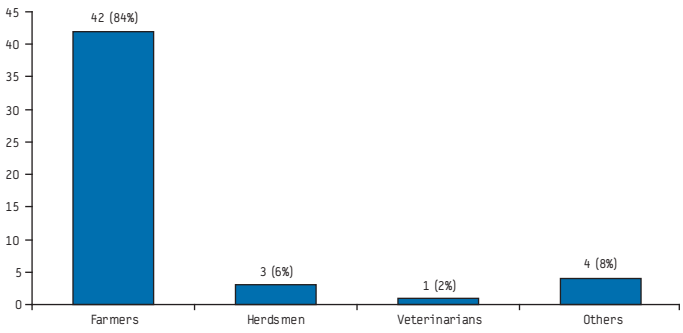


Figure 4

Occupation reported by human cases of brucellosis in the province of Haskovo, Bulgaria, 2007 (n=50)



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Pandemic phase level 5: rising number of cases in the European Union

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15 new cases of infection with the novel influenza virus A(H1N1) have been confirmed in the European Union (EU) since 28 April, bringing the total number to 19: one case in Austria, three in Germany, 10 in Spain and five in the United Kingdom. In addition, two probable cases are investigated in France. All cases had returned from a stay in Mexico and had mild symptoms [1].

There is now evidence of sustained human-to-human transmission of the virus not only in Mexico, but also in the United States (US). First evidence of a case of human-to-human transmission is also reported within the EU (Spain) [1]. The World Health Organization (WHO) therefore raised the level of pandemic alert from phase 4 to phase 5 on 29 April 2009, thereby shifting the focus from preparedness to response. This entails increased activity, particularly in the affected countries, to reduce the impact of the pandemic on society, such as pandemic disease surveillance using the agreed case definitions, assessment of the impact of the pandemic, issuing of advice to the public, measures regarding antiviral drugs, etc. [2]

A number of websites are keeping track of the continuously mounting numbers of suspected and confirmed cases across the world.

Regular updates on the outbreak of novel influenza virus A(H1N1) with a view to the implications for the European Union are published on the ECDC website at: http://www.ecdc.europa.eu/. Official information is also available from WHO and the US Centers for Disease Control and Prevention [3,4].

In response to inquiries from public health officials, Google.org launched on 29 April 2009 the site 'Experimental Flu Trends for Mexico' (http://www.google.org/flutrends/intl/en_mx/), which provides up-to-date estimates of possible influenza activity in Mexico based on aggregated search queries. In November 2008 a close relationship was found between the number of people searching for influenza-related topics and the number of people who actually have influenza symptoms. Unlike Google Flu Trends for the United States, these estimates are not verified against historical Mexican influenza data.

Another non-official table keeping track of the case numbers world-wide has been created on Wikipedia: http://en.wikipedia.org/wiki/2009_swine_flu_outbreak_by_country

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