Effective and Acceptable Strategies for the Control of SARS and new emerging infections in China and Europe

SARSControl

D8.1 Report on European control strategies

First Version

by Work Package 8

Hamburg University of Applied Science
Ralf Reintjes, Ralf Krumkamp and Annette Kassen,

Hamburg 02 January 2006
Abstract:

Communicable diseases with their potential to spread internationally have gained new significance in the light of today’s globalisation. Expanding world wide travel and trade amount makes the spread of infections to distant countries more likely then before. The 2002/2003 SARS outbreak with its origin in East Asia, hit 29 countries world wide. In Europe nine countries were affected, 33 cases of SARS and one death were registered. Especially countries which are as closely connected as the European member states are at constant risk of a cross border spread of infectious diseases. To avoid infectious diseases acquiring pandemic infections proportions a carefully public health preparation is necessary in every country. This analysis of European control strategies for infectious diseases shows that countries had act differently. Guidelines and guidance for the disease management were well in place in most parts of Europe, but the application of control measures varies among member states. In addition, until now the effectiveness of certain control measures has not been sufficiently analysed. A more detailed analysis of factors, which influences an international spread of infectious diseases, is necessary. The current report will provide baseline data for further steps. A “Hazard Analysis of Critical Control Points” (HACCP) will be under taken in the SARS Control project to analyse the response to pandemic infectious by European member states. It is evident that a fast detection of cases and a timely implementation of control measures are crucial to counter an internationally spreading infection.
Contents:

Background 1
Method 4
   Structure of policies to control SARS 4
   Recommendations for national SARS preparedness and response 4
      Structure of SARS policies 6
   Data on national SARS policies 7
      Required data 7
   Presentation of results 8
Results 10
   Response quality 10
   Control and Command 10
   Surveillance 13
   Preparedness and Response in Healthcare Facilities 14
   Community Containment Measures, Including Non-Hospital Isolations and Quarantine & Infection Control 15
   Prevention of International Travel-Related Transmission Risk 17
   Laboratory Diagnostics 19
   Communication and Education 20
   Comparison of old and new EU member states 22
   Preparedness on pandemic influenza 23
Discussion 24
   Statement of practical findings 24
      Control and Command 24
      Surveillance 25
      Preparedness and Response in Healthcare Facilities 26
      Community Containment Measures 27
      Prevention of International Travel-Related Transmission Risk 28
      Laboratory Diagnostics 29
      Communication and Education 29
   Strengths and weaknesses of the study 30
      Conclusions 31
      Future research 31
References 34
This is a preliminary version of the report. Not all data required for the analysis of European control strategies was available by the closing date (see page 7: Required data). Updated versions of this report will be distributed as soon as the data is available and analysed. Furthermore, comments on this report will be included in the updated version.

**Background**

New emerging infectious diseases with pandemic potential are challenges for public health systems all around the world. Globalisation has led to a rapid increase in travel and trade making it easy for contagious diseases to spread to distant countries. [1]. The outbreak of the severe acute respiratory syndrome (SARS) in 2002/2003 is an alarming example of a worldwide spread of an infectious disease. In 7 months 29 countries had noted SARS cases. In nine of these countries the disease was transmitted by person to person transmission, while imported cases were responsible for SARS in the other countries [2]. Since the 5th of July 2003, when the Word Health Organisation (WHO) declared the outbreak to be over, 8422 people were infected and a further 916 people died of SARS [3]. Various health systems around the world had to deal with the disease. It was international cooperation which led to a successful interruption of the transmission chain.

The probability that SARS might recur is difficult to assess, yet other diseases with a similar risk could pose a threat anytime. In the last 25 years 35 new or newly diagnosed infectious diseases were discovered [4]. If the infectious agent is easily transferred, for e.g. via droplet transmission, an adequate and quick intervention by public health authorities is necessary. Such new emerging infections pose a particular challenge to public health systems worldwide. These diseases have an unknown mode of transmission and the signs and symptoms are unclear too. Initially no therapy or vaccination exists and effective protective measures have to be searched for [5]. The main strategy to manage such an event is to be well prepared. The health related policies on international, national and institutional level have to be coordinated. Action plans, communication structures and responsibilities on the various political levels have to be developed in an applicable manner [6].

To protect countries from a global spread it is necessary to use comprehensive international networks. The main institution which is responsible for international coordination and giving advice to countries if requested is the *World Health Organisation* [7]. There are different
WHO activities supporting surveillance and management of infectious diseases. The Global alert and response network (GOLAN) [5] and activities centralised in the International Heath regulations (IHR) [8] are established to assist countries dealing with infectious diseases and monitor the global spread of infections. The European Union (EU) has passed a mandate to coordinate surveillance and management of infectious diseases [9]. The European Centre for Disease Prevention and Control (ECDC) [10], which started functioning in 2005, will coordinate the surveillance and intervention strategies at EU level. They are also responsible for managing the European Early Warning and Response System, which is monitoring the European situation of infectious diseases.

The work package 8 of the SARSControl project emphasises on the European SARS and SARS like policies. During the last years EU enlarged to 25 member states and other countries will follow. The relation of European countries is getting closer. The omission of borders and the extended trade relations are some facts which led to an increasing freight and passenger traffic. These developments make it necessary to maintain a European public health network for infectious diseases and to adjust the health care systems of the member countries to make them compatible. For an effective control of infectious diseases with potential to international spread, the quality of each health system counts. Shortcomings, such as insufficient surveillance systems or inadequate disease prevention and control programs, can lead to a rapid spread of infections to Europe [11].

The different national policies and public health systems in Europe make it likely that strategies for the containment of pandemic infections vary. Mrs Zsuzsanna Jakab; director of ECDC mentioned in an interview with the British Medical Journal “We have to have a much more coordinated and integrated approach, because it was obvious during the SARS epidemic that every country responded in a different way.”[12]. To coordinate and support members of the European federation in their public health response to infectious diseases their national preparedness has to be analysed. This includes measures like outbreak communication, availability of guidelines and the organisation of the health care systems.

The deliverable 8.1 report of the SARSControl project gives information on the national strategies and policies in practice in the various EU member states for the control of SARS and comparable infectious diseases. The subject of this paper is to give an account of SARS and SARS like policies in place in each EU state. The emphasis of this analysis lies on 1. Communication strategies on national and international level, 2. Allocation of authority, 3.
Preparedness on national, local and institutional level and 4. National guidelines and guidance.
Method

A new emerging infectious disease like SARS needs a comprehensive public health response [13]. Organized public health activities, like management structures to coordinate action at the different national levels, outbreak communication structures and the development of different guidelines for carrying out an intervention are necessary, to develop a control system. In a first step the national policies on SARS and its related areas were analysed. Different recommendations for national infectious disease control at the national level and preparedness for a SARS outbreak exist. WHO and Center for Disease Control and Prevention in Atlanta / USA (CDC) published documents on national preparedness for pandemic infections. These publications were reviewed to derive a framework of national response to infectious disease with pandemic potential. In a second step the activities of European member states was evaluated. Existing surveys on national public health policies were identified.

Structure of policies to control SARS

The following publications were reviewed to identify the areas pertaining to the national preparedness towards pandemic infections.

Recommendations for national SARS preparedness and response

A) WHO SARS Risk Assessment and Preparedness Framework [14]

This WHO document was published in October 2004 by the Department of Communicable Disease Surveillance and Response. It focuses on national response during the different epidemiological situations of SARS. It encompasses all scenarios starting from the absence of SARS up to the emergence of a global pandemic. The Epidemiological situations are subdivided into the following five phases:

Phase 0: Inter-epidemic period: No evidence of SARS-CoV transmission to humans worldwide.
Phase 1: Inter-epidemic period: Sporadic case(s) of SARS
Phase 2: Confirmed human-to-human transmission.
Phase 3: International spread of SARS
Phase 4: Slowing down of the outbreak.
Phase 5: Global interruption of SARS-CoV transmission (epidemic halted).
Recommendations for each phase are published for both, countries from where SARS is reported as well as for countries free from SARS.

B) WHO guidelines for the global surveillance of severe acute respiratory syndrome (SARS) [15]

This WHO document was published in October 2004 by the WHO Department of Communicable Disease Surveillance and Response. It is addressed to national health authorities to support appropriate surveillance activities during the different epidemiological situations of SARS, which are outlined above. The document comprises recommendations for SARS diagnoses, definition of the different SARS alert levels and guidelines for the national and global surveillance of SARS.

This document annuls the existing guideline Alert, verification and public health management of SARS in the post-outbreak period [16]. It is being updated and hence could not be included in the analysis.

C) Interim guidelines for national SARS preparedness [17]

This guideline was revised in May 2003 when SARS was still in progress. These recommendations enable public health authorities to prepare a country for an adequate response to SARS. It was published for countries which had not yet experienced any SARS cases. This guidelines includes general information about the infection, suggestions for national management and advice on different infection control measures were given.

D) Public Health Guidance for Community-Level Preparedness and Response to Severe Acute Respiratory Syndrome (SARS) [18]

The guideline from Centres for Disease Control and Prevention in USA/Atlanta (CDC) was last updated in January 2004. This document was prepared with the aim to enable local authorities to develop SARS preparedness and response plans. It includes different components of SARS policies, including management structure, surveillance and community containment measures. All parts of the document are outlined below. In addition, annexes with further information on the various areas are also available. This document provides
comprehensive recommendations for each component concerning to the control and the preparedness towards SARS.

Structure of SARS policies

The above mentioned documents were reviewed and their contents summarised. These different recommendations emphasise on national policies, which are involved in the control of SARS. The key components of SARS policies are outlined in the CDC guidelines as follows:

1. Command and Control
2. Surveillance and Information Technology
3. Preparedness and Response in Healthcare Facilities
4. Community Containment Measures, Including Non-Hospital Isolation and Quarantine
5. Management of International Travel-Related Transmission Risk
6. Laboratory Diagnostics
7. Communication and Education
8. SARS Investigations and Epidemiologic Research
9. Infection Control

It is these components of the SARS policy which constitute the primary framework for national policies. The command and control area deals with the collaboration between the government and its federal structures. A clear management structure is necessary to ensure an effective national collaboration. The surveillance department is responsible for part comprises the early and complete identification of all cases. Healthcare facilities are closely linked with distribution of the 2002/2003 SARS outbreak. Preparedness and response in healthcare facilities are therefore a major factor in the control of SARS. Infectious diseases in the absence of protective vaccines or curative treatment need classical public health interventions to be controlled. Community containment measures like isolation, contact tracing, monitoring, and quarantine should be in preparation for an epidemic event. The increasing volume of travel could introduce infectious diseases from distant countries. A management of international travel-related transmission risk is necessary to avoid the spread of a disease form one country to another. Laboratory diagnostics are important to detect a resurgence of SARS. Recommendations for laboratory work include safety regulations, guidelines for the appropriate testing of SARS, as well as determination of laboratory capacity. Communication and education strategies are necessary to maintain awareness in the post outbreak period and
to inform the public in an appropriate manner without causing panic. Owing to their similar approach the sections *Community Containment Measures, Including Non-Hospital Isolation and Quarantine* and *Infection Control* are summarised under one component.

The identified documents with policy recommendations [14;15;17;18] were reviewed and then subdivided according to the CDC headings. Each of the policy section encompasses a number of recommended measures and actions by the WHO and CDC.

This framework developed by the CDC was used to demonstrate the control and preparedness measures undertaken in the various EU member states.

**Data on national SARS policies**

The Public Health Directorate (DG SANCO) of the *European Commission* (EC) has published a report on measures undertaken to control SARS by each member state [19]. This analysis was conducted on behalf of the European Commission, to get an update on the national response of its member countries. The dataset which formed the basis of the report comprises of 97 questions covering various SARS related activities. Data which was collected during the survey included the management of definite cases, probable cases and their contacts, preparedness planning, availability of guidelines and guidance, measures applied to counter SARS, laboratory methods and information policies. An updated version of this dataset, from September 2003, is also available [20]. This dataset was used for the inventory of SARS policies by the EU member states.

The European Commission conducted a survey concerning the influenza preparedness in with the European region, in November 2005 (follow up October 2005). Data of this survey was not available while writing this report (see page 7: Required data). Preliminary data from this survey was taken from publications which are available on the eurosurveillance homepage [21,22]. Detailed data from EU member states is not available; therefore the results are displayed as percentages for the whole European region.

**Required data**

While finalising this report not all data was available. Updated versions of the report will be published as soon as this data is present and analysed.
The survey used in our analyses, published by the DG-SANCO [19;20] has no data on Bulgaria and Lichtenstein. Public health experts from Bulgaria were identified and contacted with the help of the European commission and WHO European Office. A questionnaire was sent via e-mail. The questionnaire comprises of the items which were used in the analyses.

While assigning the items of the SANCO-dataset to the identified public health components of national pandemic preparedness, some questions remained unanswered. Certain parts identified in the review of recommendations were not found in the survey. This missing data was summarised and formulated as a questionnaire. The Istituto Superiore di Sanità (ISS) in Rom / Italy is going to carry out a survey, which will be addressed to national public health experts of the European member states. The developed questionnaire will be attached to the survey.

The WHO, European Commission and ECDC are supporting countries in their efforts to be prepared for influenza. To assess the current state of preparedness a questionnaire was distributed to all countries belonging to the European region. The questionnaire inquires about the presence of a national influenza pandemic plan and evaluates components which were included. The survey was conducted in March 2005 and updated in October 2005 [21;22]. This survey was not available during the work on this report. The dataset was requested from WHO and ECDC and data will be included as soon as it is available.

**Presentation of results**

The results are presented in chapters carrying the title of the public health components identified by the CDC. Each chapter starts with a description of the recommended activities. The key areas of the different components are listed as bullet points. Parts printed in standard font show activities recommended during the absence of SARS while those printed in italics display activities during its presence of SARS. Data is presented country wise in tables and described in the attached text.

**Country codes**

The following country codes were used to abbreviate the EU member states.

<table>
<thead>
<tr>
<th>EU-Member States</th>
<th>Belgium</th>
<th>B</th>
<th>Czech Rep.</th>
<th>CZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>A</td>
<td></td>
<td>Cyprus</td>
<td>CY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Denmark</td>
<td>DK</td>
</tr>
<tr>
<td>Country</td>
<td>Code</td>
<td>Country</td>
<td>Code</td>
<td>EFTA-Countries</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>-------------</td>
<td>------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Estonia</td>
<td>EST</td>
<td>Lithuania</td>
<td>LT</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>FIN</td>
<td>Luxembourg</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>F</td>
<td>Malta</td>
<td>M</td>
<td>Iceland</td>
</tr>
<tr>
<td>Germany</td>
<td>D</td>
<td>Netherlands</td>
<td>NL</td>
<td>Norway</td>
</tr>
<tr>
<td>Great Brittan</td>
<td>GB</td>
<td>Poland</td>
<td>PL</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Greece</td>
<td>GR</td>
<td>Portugal</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>H</td>
<td>Slovakia</td>
<td>SK</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>IRL</td>
<td>Slovenia</td>
<td>SLO</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>I</td>
<td>Spain</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Latvia</td>
<td>LV</td>
<td>Sweden</td>
<td>S</td>
<td></td>
</tr>
</tbody>
</table>
**Results**

**Response quality**

About 17% of questions asked for in the DG-SANCO survey remained unanswered. The response to the questions differed between the participating countries. Only 25% of questions were replied by Slovakia. Countries answering less than 80% of the questionnaire included Cyprus (64%), Romania (66%), Luxembourg (69%), Sweden (71%), Switzerland (72%), Germany (73%) and Spain (73%). The cumulated response in categories expressed as percentages are given in table 1.

<table>
<thead>
<tr>
<th>Response Category</th>
<th>Percentage</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countries answering &lt; 80% of questions</td>
<td>28% (8/29 countries)</td>
<td></td>
</tr>
<tr>
<td>Countries answering 80-89.9% of questions</td>
<td>31% (9/29 countries)</td>
<td></td>
</tr>
<tr>
<td>Countries answering &gt; 90% of questions</td>
<td>41% (12/29 countries)</td>
<td></td>
</tr>
</tbody>
</table>

(Tab. 1: Response quality of the survey "Measures undertaken by member states and accession countries" [20], Sep. 2003)

**Control and Command**

To carry out rapid and decisive action in case of a pandemic infection, an effective collaboration among all involved public health components is essential. A comprehensive management and a coordinated networking between the parties concerned on all political levels is necessary. Therefore a coordinated response has to be established to make sure that all parts which are involved in the response are functioning.

**Summary of suggested activities:**

- Develop standard operational procedures for the investigation, clinical /public health management and for a national risk assessment
- Reporting clusters to WHO promptly and transparently
- Establish a preparedness planning with a range of disciplines
- Establish controlling, communication, collaboration and documentation of actions
• Develop an authority to coordinate the response activities

• *Activate national response mechanism*  

• *Maintain awareness of global and regional SARS activities*  

• *Report a SARS alert to WHO within 24 hours*  

(Normal font recommendations during the absence of SARS, italic recommendations in the event of a SARS outbreak; Included documents: WHO-recommendations = 1; CDC-guidelines = 2)

<table>
<thead>
<tr>
<th>Timely reporting to the Commission</th>
<th>96.6</th>
<th>0.0</th>
<th>3.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timely reporting to WHO</td>
<td>96.6</td>
<td>0.0</td>
<td>3.4</td>
</tr>
<tr>
<td>Guidance to counter local transmission</td>
<td>79.3</td>
<td>0.0</td>
<td>20.7</td>
</tr>
<tr>
<td>Provision of guidance and information to regional public health authorities</td>
<td>93.1</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Reports of suspected cases received centrally</td>
<td>69.0</td>
<td>6.9</td>
<td>24.1</td>
</tr>
<tr>
<td>Inter-ministerial cooperation</td>
<td>82.8</td>
<td>6.9</td>
<td>10.3</td>
</tr>
</tbody>
</table>

**Contingency planning:**

<table>
<thead>
<tr>
<th>Models and exercises</th>
<th>37.9</th>
<th>34.5</th>
<th>27.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>stockpiling</td>
<td>37.9</td>
<td>27.6</td>
<td>34.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rate of strict isolation units available per 100,000 people</th>
</tr>
</thead>
<tbody>
<tr>
<td>A   B   DK   FIN   F   D   GR   IRL   I   L   NL   P   E   S   GB</td>
</tr>
<tr>
<td>1.15 0.58 0.54 1.98 0.01 0.11 0.33 1.99 0.15 2.25 0.04</td>
</tr>
</tbody>
</table>
The majority of countries have installed a well structured control and command system. Timely reporting of cases to the WHO and to the European Commission is practiced in most countries. One country did not answer on their reporting strategy. Switzerland did not comment on their reporting practice to WHO while Lithuania did not answer questions concerning their reporting to the EC. All other countries reported to both, WHO and EC. Guidance to counter local transmission and guidelines for regional public health authorities were given in most member states. Central reporting of suspected cases inside a county is done in all countries except in Island and Norway.

Answers concerning the implementation of models and exercises differ between the countries, just as stockpiling of therapeutic and protective equipment does shows similar results. The number of answers given in yes, no or not known were nearly the same. An inter-ministerial cooperation was reported in most countries except Ireland and Norway.

The number of isolation units available per 100,000 people varies significantly between the countries, France having the least with 0.01 and Island having the largest number of isolation units with 5.52 per 100,000 inhabitants. The mean number of available isolation units (/100.000 persons) is estimated to be 0.84.
Surveillance

The major goal of SARS surveillance is the rapid and complete identification of cases. Knowledge about the transmission pattern from a previous outbreak is useful for conducting an efficient surveillance. Experience gained from the last SARS outbreak emphasises that surveillance activities should particularly focus on communities living in close contact with animals, junctions of international travel and people working in the health care sector or those closely connected with it. Monitoring for large clusters of pneumonia is also recommended, to ensure that new cases of respiratory tract infection are detected early. Contact tracing is an additional surveillance tool to identify persons at risk of infection and transmission. Information on this measure is included in the component *Community containment measures*.

Summary of suggested activities:

- Accelerate early detection of clusters of respiratory tract infection, inform clinicians and public health workers
- Develop tools to identify and monitor contacts
- Identify surge capacity for an event of SARS
- *Enhance passive surveillance and active case finding*
- *maintain prompt and complete identification and reporting of potential cases to facilitate outbreak control and management*
- *Identify and monitor contacts of cases*

(Normal font recommendations during the absence of SARS, italic recommendations in the event of a SARS outbreak; Included documents: WHO-recommendations = 1; CDC-guidelines = 2)

<table>
<thead>
<tr>
<th>enhanced surveillance activities for SARS</th>
<th>positive</th>
<th>%</th>
<th>negative</th>
<th>%</th>
<th>not known</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, D, GR, IRL, L, NL, P, E, S, GB, CY, CZ, EST, H, LV, LT, M, PL, SK, SLO, IS, N, CH, RO</td>
<td>96.6</td>
<td>3.4</td>
<td>0,0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SARS mandatory notification</th>
<th>positive</th>
<th>%</th>
<th>negative</th>
<th>%</th>
<th>not known</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, D, IRL, L, NL, P, E, S, CY, CZ, EST, H, LV, LT, M, PL, SK, SLO, IS, N, CH, RO, GR, L, GB</td>
<td>89.7</td>
<td>10.3</td>
<td>0,0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Tab. 3: Questions regarding surveillance of SARS in EU-Member States, taken from the EU Survey "Measures undertaken by member states and accession countries" [20], Sep. 2003)
Most countries, except Italy, have applied enhanced surveillance activities for SARS. In most countries SARS notification is mandatory. Greece, Luxembourg, and Great Britain have reported that SARS notification is not mandatory in their country. The recommended identification of surge capacity was not included in the survey.

### Preparedness and Response in Healthcare Facilities

In the 2002/2003 SARS outbreak a large proportion of cases were found among health care workers (HCW), or individuals linked to the healthcare setting. Some outbreaks were propagated within hospitals or introduced from the hospital setting into the community. Prompt and decisive use of control measures in healthcare settings is essential to prevent further spread. Each hospital has to be prepared for the identification, triage and management of SARS patients.

### Summary of suggested activities:

- Develop institutional preparedness and response plans
- Develop surveillance plans for various levels of SARS transmission
- Determine current availability of infrastructure and resources
- Develop strategies to educate staff and patients
- Close down affected HC-facilities to new admissions and implement surveillance activities for staff and patients
- Reinforce basic infection control practices among healthcare workers
- Ensure appropriate management and follow-up monitoring of HCW who were in contact with SARS patients

(Normal font recommendations during the absence of SARS, italic recommendations in the event of a SARS outbreak; Included documents: WHO-recommendations = 1; CDC-guidelines = 2)
positive % | negative % | not known %
---|---|---
### Appropriate protection of hospital personnel:

<table>
<thead>
<tr>
<th>triage guidelines</th>
<th>CH</th>
<th>A, GB, RO</th>
</tr>
</thead>
<tbody>
<tr>
<td>B, DK, FIN, F, D, GR, IRL, I, L, NL, P, E, S, CY, CZ, EST, H, LV, LT, M, PL, SLO, IS, N</td>
<td>86.2</td>
<td>3.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>facilities for the management and diagnosis of SARS cases identified</th>
<th>A, SK</th>
</tr>
</thead>
<tbody>
<tr>
<td>B, DK, FIN, F, D, GR, IRL, I, L, NL, P, E, S, GB, CY, CZ, EST, H, LV, LT, M, PL, SLO, IS, N, CH, RO</td>
<td>93.1</td>
</tr>
</tbody>
</table>

### Provision of guidance and information to:

<table>
<thead>
<tr>
<th>hospital staff</th>
<th>A, B, DK, FIN, F, D, GR, IRL, I, L, NL, P, E, S, GB, CY, CZ, EST, H, LV, LT, M, PL, SK, SLO, IS, N, CH, RO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>in-hospital infection control committees</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, D, GR, IRL, I, L, NL, P, E, S, GB, CY, CZ, EST, LV, LT, M, PL, SK, SLO, IS, N, CH, RO</td>
<td>96.6</td>
</tr>
</tbody>
</table>

(Tab. 4: Questions regarding the preparedness and response to SARS in health care facilities of EU-Member States, taken from the EU Survey "Measures undertaken by member states and accession countries" [20], Sep. 2003)

Most countries are applying the recommendations according to the preparedness and response in healthcare facilities. Triage guidelines for the diagnoses of SARS patients were in place in 86% of the countries. Facilities for the management and the diagnoses of SARS were identified in 93% of the responding countries.

Guidance and information are provided to hospital and laboratory staff and to an in-hospital control committee in all responding countries.

### Community Containment Measures, Including Non-Hospital Isolations and Quarantine & Infection Control

During the 2002/03 SARS outbreak conventional public health containment measurers has been proved to be effective. Precautionary measures applied to control an infectious disease outbreak on an individual level included isolation, contact tracing, monitoring, and quarantine. Persons infected with SARS cannot pass on the virus before the onset of
symptoms, which makes containment activities effective. Broader community containment measures focus on the avoidance of unnecessary person to person contact. These measures are also called “snow day type measures”. Typical activities in this area are cancelling of public gatherings, closure of schools and businesses and, under extreme circumstances, closing of borders as well.

**Summary of suggested activities:**

- Develop triage strategies for early detection of SARS patients
- Develop appropriate precautionary measures for infection control
- **Monitor contacts of cases and consider quarantine if needed**
- **Continues monitoring of the outbreak and evaluation of the need for community containment measures**
- **Addressing of cultural and linguistic needs**

(Normal font recommendations during the absence of SARS, italic recommendations in the event of a SARS outbreak; Included documents: WHO-recommendations = 1; CDC-guidelines = 2)

<table>
<thead>
<tr>
<th>positive</th>
<th>%</th>
<th>negative</th>
<th>%</th>
<th>not known</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>contact tracing of suspected and probable SARS cases</td>
<td>100.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special measures for mass gatherings</td>
<td>27.6</td>
<td>65.5</td>
<td>6.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>legal applicability of quarantine measures to SARS cases and their contacts</td>
<td>65.5</td>
<td>24.1</td>
<td>10.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Isolation for**

<table>
<thead>
<tr>
<th>positive</th>
<th>%</th>
<th>negative</th>
<th>%</th>
<th>not known</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected cases</td>
<td>100.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
probable cases

<table>
<thead>
<tr>
<th>Country Abbreviation</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, D, GR, IRL, I, L, NL, P, E, S, GB, CY, CZ, EST, H, LV, LT, M, PL, SK, SLO, IS, N, CH, RO</td>
<td>100.0</td>
</tr>
</tbody>
</table>

(Tab. 5: Questions regarding community containment measures related to SARS in EU-Member States, taken from the EU Survey "Measures undertaken by member states and accession countries" [20], Sep. 2003)

One of the most important measures to prevent the spread of SARS is the tracing of SARS contacts which was applied in every responding country. Data on the avoidance of unnecessary personal contact was asked for in two questions. Special measures for mass gatherings were only applied in 8 countries. 19 countries negated to have applied such measure. The legal basis to enforce quarantine was given in 66% of the countries.

**Prevention of International Travel-Related Transmission Risk**

An infectious disease like SARS could spread easily around the world through international travel. The last outbreak has shown that the control of travel related transmission risks is crucial to avoid international spread. Screening and evaluating passengers for symptoms, educating them about SARS and reporting disease in travellers are measures which could be applied to control travel related transmission.

**Summary of suggested activities:**

- *Screening incoming passengers from affected areas and outbound travellers* \(^2\)
- *Give guidance to travellers in SARS-affected areas* \(^2\)
- *Ensure the appropriate evaluation and management of people on conveyances* \(^2\)

(Normal font recommendations during the absence of SARS, italic recommendations in the event of a SARS outbreak; Included documents: WHO-recommendations = 1; CDC-guidelines = 2)
### Provision of guidance and information to medical staff at airports

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
<th>Not Known</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, D, GR, IRL, I, NL, P, E, GB, CY, CZ, EST, H, LV, LT, M, PL, SK, SLO, IS, N, CH, RO</td>
<td>L, S</td>
<td>93.1</td>
</tr>
</tbody>
</table>

### Provision of guidance and information to travellers to areas where local transmission is present:

#### Provision of guidance and information to travellers to areas where local transmission is present:

#### Provision of guidance and information to travellers from areas where local transmission is present:

- **Information leaflets distributed to all incoming passengers at arrival:**
  - A, DK, F, D, GR, IRL, I, E, GB, CY, H, LV, LT, M, PL, SLO, IS, RO
  - B, FIN, L, NL, P, S, CZ, EST, N, CH
  - SK
  - 62.1
  - 34.5
  - 3.4

- **Information leaflets distributed on board to passengers incoming from affected areas:**
  - DK, FIN, F, D, GR, IRL, NL, E, CY, H, LT, PL, CH, RO
  - I, L, P, S, CZ, EST, LV, M, SLO, N
  - A, B, GB, SK, IS
  - 48.3
  - 34.5
  - 17.2

- **Posters at arrival airport lounges:**
  - A; B; DK; F; D; GR; IRL; I; L; E; S; GB; CY; CZ; EST; H; LV; LT; M; PL; IS; N; CH
  - FIN; NL; P; SLO; RO
  - SK;
  - 79.3
  - 17.2
  - 3.4

- **Distribution of traceability cards to all passengers from affected areas:**
  - F, GR, P, E, CY, LT, PL, CH
  - A, B, DK, FIN, D, IRL, I, L, NL, S, GB, CZ, EST, H, LV, M, SLO, IS, N, RO
  - SK
  - 27.6
  - 69.0
  - 3.4

- **Distribution of traceability cards only to passengers in the event of a suspect case is identified on board:**
  - A, B, DK, FIN, D, GR, NL, EST, LV, LT, M, PL, SLO, IS, N, CH
  - F, IRL, I, L, P, E, S, GB, CY, CZ, H, RO
  - SK
  - 55.2
  - 41.4
  - 3.4

- **Specific information for air crew (guidelines):**
  - A, B, DK, FIN, F, D, GR, IRL, I, L, NL, P, E, GB, CY, CZ, EST, H, LV, LT, M, PL, SLO, IS, N
  - S, CH
  - SK
  - 89.7
  - 6.9
  - 3.4

### Measures for international travellers arriving or in transit from affected areas:

- **Health screening at arrival:**
  - E, CY, H, LV, LT, M, PL, RO
  - A, B, DK, FIN, F, D, GR, IRL, I, L, NL, P, S, GB, CY, CZ, EST, SLO, N, CH
  - SK, IS
  - 27.6
  - 65.5
  - 6.9

- **Availability of dedicated isolation areas in the airport:**
  - A, DK, FIN, F, D, GR, L, P, E, S, GB, CY, EST, H, LV, M, PL, CH, RO
  - IRL, NL, CZ, LT, SLO, IS, N
  - B
  - 65.5
  - 27.6
  - 6.9

*(Tab. 6: Questions regarding the control of travel related transmission of SARS in EU-Member States, taken from the EU Survey "Measures undertaken by member states and accession countries" [20], Sep. 2003)*
Guidance and information to travellers from affected areas was given in various forms. Most countries (62%) used posters at the airport arrival lounges. 58% of the countries distributed information leaflets to all incoming passengers while 48% of the countries distributed leaflets in airplanes form affected countries. Poland is the only country which did not use the precautionary measures stated above. Guidance and information for medical staff at airports was provided in 93% of the interviewed countries. Guidance and information for travellers to areas where local transmission is present were distributed in 55% of the countries.

Traceability cards were distributed to all passengers from affected countries in 8 EU member states. 16 countries distributed traceability cards to passengers, if a suspected SARS case was identified on board. The EU reported that 16 EU member states (Belgium, Czech Republic, Denmark, Estonia, Finland, France, Greece, Italy, Lithuania, Luxembourg, Malta, The Netherlands, Portugal, Romania and Spain) have an agreement with airlines for traceability. These agreements include the storage of personal data from travellers [EU-inventory]. Specific information to the air crew members was distributed in 90% of the countries.

Eight of the responding countries applied health screening on arrival. 66% of the countries did not apply this measure. The availability of isolation areas was reported form 66% of the responding countries.

**Laboratory Diagnostics**

For the prompt detection of a resurgence of SARS the correct handling of specimens and interpretation of laboratory diagnosis is essential. Detected clusters of respiratory illness have to be analysed in an appropriate manner, to differentiate other respiratory diseases from SARS.

**Summary of suggested activities:**

- Improve the ability to detect SARS ²
- Provide guidance for laboratory safety ²
- Correct interpretation of test results ²
- Identify surge capacity for an event of an Outbreak ²
Guidance on collection, transportation, storage, and shipment of clinical specimens

<table>
<thead>
<tr>
<th>Positive</th>
<th>%</th>
<th>Negative</th>
<th>%</th>
<th>Not Known</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, GR, IRL, I, NL, P, E, S, GB, CY, EST, H, LV, LT, M, PL, SK, IS, N, CH, RO</td>
<td>86.2</td>
<td>D, L, CZ; SOL</td>
<td>0.0</td>
<td>13.8</td>
<td></td>
</tr>
</tbody>
</table>

Provision of guidance and information to laboratory staff

| Guidance on collection, transportation, storage, and shipment of clinical specimens | 96.6 | I |

Centralized testing of SARS (National reference laboratory)

| Centralized testing of SARS (National reference laboratory) | 82.8 | 0.0 | 6.9 |

National protocols for SARS laboratory diagnosis

| National protocols for SARS laboratory diagnosis | 75.9 | 3.4 | 20.7 |

Communication and Education

Communication is a vital component to control a SARS outbreak. Each epidemiological situation of a possible SARS outbreak needs appropriate information, which has to be circulated rapidly. In the absence of global transmission the maintenance of vigilance, especially in the healthcare community, is necessary. In case of a reoccurrence of SARS...
information and guidelines have to be presented to the public, policymakers and healthcare workers. A domestic outbreak will lead to an even higher demand of actual information.

Summary of suggested activities:

- Identify key massages and effective measures to deliver them
- Provide communication and emergency response personnel
- Coordinate requests for spokespersons and experts in the field
- Run campaigns for public awareness, communicate the risk to the public

(Normal font recommendations during the absence of SARS, italic recommendations in the event of a SARS outbreak; Included documents: WHO-recommendations = 1; CDC-guidelines = 2)

<table>
<thead>
<tr>
<th>guidance on how individuals should react to appearance of SARS compatible symptoms</th>
<th>positive</th>
<th>negative</th>
<th>not known</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, D, GR, IRL, I, NL, P, E, S, GB, CY, CZ, EST, H, LV, LT, M, PL, SK, SLO, IS, N, CH, RO</td>
<td>100.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>information is disseminated by dedicated web site</th>
<th>positive</th>
<th>negative</th>
<th>not known</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, D, GR, IRL, I, NL, P, E, S, GB, CY, CZ, EST, H, LV, LT, PL, SLO, IS, N, CH</td>
<td>82.8</td>
<td>10.3</td>
<td>6.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>information disseminated by media</th>
<th>positive</th>
<th>negative</th>
<th>not known</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, D, GR, IRL, I, NL, P, E, S, GB, CY, CZ, EST, H, LV, LT, IS, N, CH, RO</td>
<td>96.6</td>
<td>0.0</td>
<td>3.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>information disseminated by telephone hot line</th>
<th>positive</th>
<th>negative</th>
<th>not known</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, DK, FIN, F, D, GR, IRL, I, NL, P, E, S, GB, CY, CZ, EST, PL, SLO, IS, N, CH</td>
<td>75.9</td>
<td>20.7</td>
<td>3.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>actions to counter discrimination</th>
<th>positive</th>
<th>negative</th>
<th>not known</th>
</tr>
</thead>
<tbody>
<tr>
<td>DK, F, L, NL, GB, CY, H</td>
<td>24.1</td>
<td>48.3</td>
<td>27.6</td>
</tr>
</tbody>
</table>

Tab. 8: Questions regarding communication and SARS education in EU-Member States, taken from the EU Survey "Measures undertaken by member states and accession countries" [20], Sep. 2003

Guidance on how people should react if symptoms of SARS appear was given in each state. In the survey different ways of spreading information were asked for. Most countries (97%)
used the media to provide information on SARS to the public. Web-based information was disseminated in 82% of the countries and 75% provided a telephone hotline to inform the public about SARS. Special actions to counter discrimination were reported from 7 counties. 48% of the responding countries have no such measures in place.

### Comparison of old and new EU member states

A further analysis focuses on the control measures undertaken by the old and the new EU member states. To compare this group of countries 54% of the items from the EC survey “Measures undertaken by member states and accession countries” [19] were selected. Items were grouped into six categories and percentages for the implementation of these measures were calculated to compare new and old EU member states (Table 9).

Analysis shows that both old and new European member states, applied enhanced surveillance nearly completely. The essential legal aspects were realized by most states. Notable differences were seen in the application of laboratory methods (Serology and PCR for SARS-CoV, reference laboratories) and for measures of risk communication (e.g. guidance to health care workers returning from affected areas, circulating information using technology, actions to counter discrimination). Measures to prevent travel related infections is the only category where the accession countries reported more frequent on.

<table>
<thead>
<tr>
<th>Control measures</th>
<th>EU 15 yes (%)</th>
<th>Accession/ RO yes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal aspects (3)</td>
<td>78,0</td>
<td>79,0</td>
</tr>
<tr>
<td>Surveillance (7)</td>
<td>97,1</td>
<td>96,1</td>
</tr>
<tr>
<td>Risk communication (14)</td>
<td>91,4</td>
<td>79,9</td>
</tr>
<tr>
<td>Preparedness and response (10)</td>
<td>71,3</td>
<td>68,3</td>
</tr>
<tr>
<td>Measures to prevent travel-related infections (12)</td>
<td>52,8</td>
<td>58,6</td>
</tr>
<tr>
<td>Laboratory and biosafety (6)</td>
<td>87,7</td>
<td>63,8</td>
</tr>
<tr>
<td>Average for all categories</td>
<td>79,7</td>
<td>74,3</td>
</tr>
</tbody>
</table>

Table 9: Groups of items taken from the EC survey “Measures undertaken by member states and accession countries” [20], Sep. 2003, Comparison of application among old and new EU member states.
Preparedness on pandemic influenza

To assess the preparedness planning for pandemic influenza of European countries a survey was undertaken by EC, ECDC and WHO. Data of this survey, available from publications, was used to analyse national influenza policies.

By October 2005, 46 of the 52 countries of the European region, reported to have a pandemic influenza plan available. All 25 EU states confirmed having such a prepared plan.

<table>
<thead>
<tr>
<th>Components of plan</th>
<th>46 countries of the European region with pandemic influenza plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear division of responsibilities, obligations and mandates</td>
<td>37 (80%)</td>
</tr>
<tr>
<td>Surveillance systems</td>
<td>41 (89%)</td>
</tr>
<tr>
<td>Laboratory capacity and role</td>
<td>38 (83%)</td>
</tr>
<tr>
<td>Healthcare organisation</td>
<td>38 (83%)</td>
</tr>
<tr>
<td>Maintenance of essential community services</td>
<td>27 (59%)</td>
</tr>
<tr>
<td>Strategy for antivirals</td>
<td>36 (87%)</td>
</tr>
<tr>
<td>Strategy for vaccines/vaccination</td>
<td>36 (87%)</td>
</tr>
<tr>
<td>Strategy for information to public and media</td>
<td>36 (87%)</td>
</tr>
<tr>
<td>Other public health measures (social distancing etc)</td>
<td>33 (72%)</td>
</tr>
<tr>
<td>Plan tested in simulation exercise</td>
<td>5 (11%)</td>
</tr>
</tbody>
</table>


Different aspects could be included in an influenza plan. Table 10 shows components available in the plans of 46 countries of the European Region. Many of the asked components were included in the pandemic influenza plans, in October 2005. The preparedness for surveillance activities is available in most pandemic plans (89%). The survey shows that preparing for public health measures (72%) and maintenance of essential community services (59%) is less implement.

The survey also showed that eastern countries within the European Region are focusing more on traditional outbreak control (non pharmaceutical measures). Western countries placed more emphasis on antiviral and vaccination strategies. The testing of plans, by running an exercise, has only been done by 5 of the 46 countries.
**Discussion**

**Statement of practical findings**

Most countries had installed comprehensive prevention and control measures to prevent the spread of SARS. Yet considerable differences were seen in some of areas. A much more coordinated and methodological approach within Europe is needed for effective prevention and control of infectious diseases with pandemic potential.

**Control and Command**

During the 2002/03 SARS outbreak national control and command structures from EU member states and the EU accession countries were reported to be well organised. Nearly all countries declared reporting new SARS cases swiftly to the WHO and the European Commission. It is essential that the exchange of information among countries functions efficiently. This is one of the major lessons learned from the 2002/03 SARS outbreak [23]. Especially countries which are as closely linked as the EU member states need a systematic flow of information. International organisations, like the WHO are aware of this need and support countries in this regard [7].

In order to support the EU countries in their efforts towards SARS prevention and control and for a coordinated action of the different hierarchical levels, all groups involved should receive comprehensive guidance. The direct work with infected individuals occurs at the local level. Health authorities have to organise and coordinate activities at the local level and health care facilities need to ensure a quick and adequate handling of cases. Guidance to participating work groups will ensure an effective response. Counselling to counter local transmission and to support local health authorities was carried out in most of the countries.

Surge capacity describes the capability of a national health system, to deal with a health emergency. Health systems with meagre resources could be overwhelmed by such unexpected health threats. Models and exercises of outbreak events are a useful tool to determine the vulnerability of a national health system. Only one of three countries reported such activities. To guarantee adequate preparedness, model simulations on the European level are useful. A Europe-wide simulation exercise for pandemic influenza was conducted in November 2005, on behalf of the European commission. Such exercises are an opportunity to identify areas which require improvement [24]. These collective exercises provide a chance, for each country to judge its strengths and weaknesses regarding preparedness for pandemic infections.
Stockpiling of antiviral drugs and antibiotics is one possibility to prepare for a pandemic event. To treat a high number of infected people enough adequate drugs have to be available. Stockpiling of antiviral agents is recommended for the national influenza pandemic preparedness [25]. The WHO also stockpiles Oseltamivir (Tamiflu®) for an international distribution in case of emergency. Especially poor countries are not able to build up an own stock of antiviral drugs [26]. One third of the interviewed countries reported to stockpiling recommended drugs. However, drug resistance to certain influenza strains has been reported. Research findings on resistant strains of the currently occurring H5N1 virus have been published recently [27;28]. To prevent the development of drug resistance appropriate use of pharmaceuticals is essential. However, in case of a new emerging infection such pharmaceutical drugs could be ineffective. Extensive public health preparedness is necessary to assure an effective combination of measures to control further spread.

The number of available isolation units varies significantly between the European countries. This emphasises the need for national preparedness to treat cases in not specially equipped units. This signifies the importance of guidelines for setting up isolation units in non declared areas and for stockpiling of required equipment.

**Surveillance**

Surveillance is one of the major activities to control the spread of infectious diseases. Rapid and complete identification of all cases is necessary for effective containment of infectious disease, especially with pandemic potential. Modelling analysis revealed that a rapid application of control measures is important to control an outbreak. A timely implementation of control measures will reduce both, the amount of people getting infected and the duration of the outbreak [29]. Therefore a comprehensive surveillance scheme has to provide rapid and complete information about the outbreak situation, to enable an immediate response. Nearly all countries reported to having applied enhanced surveillance activities during the SARS pandemic. The analysed data reflects the awareness of countries to apply enhanced surveillance. Yet for evaluating the quality of surveillance systems further analysis is needed.

Data is also given on the mandatory notification of SARS. In ten percent of the countries SARS is not a notifiable disease. The Health Protection Agency (HPA) in Great Britain published a discussion paper regarding the declaration of SARS as a notifiable disease. They
pointed out, that making SARS a notifiable disease is unlikely to increase the completeness number of notifications, as notifications are often inaccurate anyway [30].

**Preparedness and Response in Healthcare Facilities**

The spread of SARS is closely linked with the preparedness of the health care setting. One third of the infected individuals were health care workers and approximately eighty percent of cases acquired SARS in health care facilities [31]. This fact stresses the importance of preparedness of health care settings in the control of SARS. The dataset shows that guidance was given and information was distributed to hospital staff as well as to in-hospital control committees in nearly each country. This reflects the importance which member states attach to tackling the problem of a nosocomial transmission. However, this study is not adequate to measure the quality of information or of guidance. Guidelines are often complex and tiresome to read. In the event of a SARS or influenza epidemic health care workers are unlikely to spend time reading complicated guidelines [32]. The provision of guidance seems to be more affective to guarantee an effective response.

A reliable diagnosis and an adequate handling of suspected cases is necessary to prevent further spread. Due to the seasonality of respiratory infections it is possible that a resurgence of SARS might coincide with other diseases having similar initial symptoms. An algorithm to triage fever patients is a useful tool to guide the diagnostic process [31]. Most countries have developed triage guidelines and identified triage facilities. International standards for the diagnosis of new emerging infections have to be published in time to maintain appropriate case identification in every country.

Most countries have assigned facilities for the management of SARS cases. The prior identification of hospitals for the care of possible cases is a useful preparation to guarantee an appropriate handling and caring of patients. Several cases could be treated adequately in a well prepared setting. An exchange of patients or HCW between hospitals should be avoided. The SARS outbreak in Toronto has shown, that a virus could be introduced by such a transfer to a different setting and lead to new transmission chains [33].
Community Containment Measures

Traditional public health interventions have been proved to be effective during the 2002/03 SARS outbreak. However, effectiveness of some measures remains unclear [34]. This highlights the need for further investigation.

The implementation of control measures was assessed in the analysed survey. All countries applied contact tracing of suspected or probable cases. This is an effective measure to ensure that contacts of cases do not develop symptoms within the incubation period. Contact tracing is useful for less contagious diseases like SARS, which has a basic reproductive number ($r_0$) of approximately 3 [35]. Contacts of persons infected with e.g. influenza are unlikely to be discovered by contact tracing. The number of people getting infected will be much higher [36]. The enormous effort which is needed to trace contacts of a highly infective disease makes it inapplicable.

Quarantining of suspected or possible cases is appropriate to prevent the spread of infection and to ensure rapid response in case symptoms of SARS develop. The WHO has recommended countries to be prepared for quarantine measures in case of an emergency [14]. In case of an infection treatment could start early and possible of further transmission could be limited. Quarantine is an appropriate measure to deal with close contacts of infected individuals. This explains the need for tracing contacts of SARS cases and makes it effective in combination with quarantine. It is remarkable that all countries reported carrying out contact tracing, yet only 66 % claimed to have a legal basis permitting the application of quarantine.

Isolation measures are going to be applied if individuals develop symptoms of SARS or have been diagnosed with SARS. The survey provides data on the isolation of suspected and probable cases. All countries reported to apply isolation for both. The ability to deal with a larger number of infected people is important. During an epidemic the surge capacity for isolation has to be high. Guidelines to maintain isolation even in non isolation wards are needed.

Airborne infections can easily spread by events were many people are present. This makes it all the more important to have a well arranged and functioning hygiene and security plan to enable a save event. Experiences from Switzerland have shown that major public events did not have to be cancelled if a security plan is in operation [37].
Analyses of the 2002/03 SARS outbreak show that a combination of control measures is essential to combat further transmission. Modelling analyses show that the early hospitalisation and avoidance of unnecessary contacts is a means, to control an outbreak of SARS [38]. Wallinga and Teunis emphasised that the early implementation of control measures is essential to reduce the extent of an outbreak. “Delaying the institution of control measures by 1 week would have nearly tripled the epidemic size and would have increased the expected epidemic duration by 4 weeks.” [29]. Outbreaks have to be continuously monitored to ensure the appropriate application of control measures.

**Prevention of International Travel-Related Transmission Risk**

SARS was able to spread to distant countries by air travel activities of infected individuals. Therefore, measures to protect people while travelling are vital. Airports and airplanes are suitable places to give guidance and to distribute information to a vulnerable group of people. Information was given to both, inbound and outbound passengers. The diversity of communication strategies used, especially for people on travel, seems to be a good approach to reach a large number of people. To make sure that information will be understood and followed by most individual’s language and education status has to be taken into account [39].

Some countries did screening for individuals with SARS symptoms at airports. Different screening measures, like the interrogation of travellers to detect possible symptoms of SARS, or inquiry about possible contact to infected persons, or the installing of thermal scanning machines were used. Due to the low prevalence of SARS and a positive predictive value of screening of essentially zero, the likelihood to detect cases is rather low [40]. The long incubation period of SARS, of approximately 10 days, makes a developing of symptoms during air travel unlikely [41]. The low sensitivity of entry screening and the high costs, which are associated with the application, make such measures unsuitable to control people on travel.

Some countries reported to have isolation areas on airports. It is likely that most infected people asked for medical care in official health care facilities and not at airports [38]. The preparation of isolation areas is complex and cost intensive and the expected utilization is low.

Guidance and information for medical staff at airports was provided in nearly every country. Even if the appearance of SARS cases at airports is estimated to be low, the preparation of
medical personnel is beneficial. Airports are junctions for travellers all around the world. Guidelines on how to deal appropriately with a suspected or infected case have to exist.

Having a look on the prevention of travel related infections shows the diversity of areas associated with it. The effectiveness of intervention measures, the resulting costs caused by it, ethical and psychological consequences has to be taken into account, while discussing interventions.

**Laboratory Diagnostics**

Laboratory guidelines are necessary to ensure the appropriate application and interpretation of laboratory tests, as well as the safe handling of specimens. The need to pay attention to laboratory safety is highlighted by SARS cases, who acquired the infection in laboratories after the 2002/03 outbreak. One laboratory worker got infected in December 2003 in Taiwan [42] and a further 9 people got ill in April 2004. One of them died [43]. Nearly all countries provided guidelines and guidance to laboratory staff for the correct application of testing procedures and the safe transportation and handling of specimens. This is also crucial considering the fact that most countries use reference laboratories to analyse samples which implies that highly infectious material has to be carried in a safe way.

**Communication and Education**

Not only the recently published *WHO guidelines for risk communication during outbreak situations* have highlighted, that communication is a crucial tool to gain public trust and compliance [39]. The avoidance of stigmatisation and fear is important to ensure that people will avail medical care if needed, and that they are not scared about the negative consequences. Communication is an effective tool to support people at risk, to maintain public confidence and to reduce discrimination [44]. Information to the public was distributed in different ways in each EU country. Risk communication is complex to perform and therefore difficult to analyse. The application of guidelines and dispersion of information by different means of communication shows, that countries are aware of the need of efficient risk communication. A comment on the state of risk can only be made after a detailed survey. The SARSControl project has a separate work package (WP 6 – Risk communication Policies) which will evaluate risk communication and give recommendations.
Strengths and weaknesses of the study

The report is mainly based on data on an analysis which was carried out by the European Commission, supported by WHO and ECDC data on influenza. Official experts from each EU country responded to formal requests of international agencies. Thus it can be assumed that the data collection process was taken seriously.

Due to the enormous effort which would be necessary to interview public health officials from all 25 European member states the conduction of an own survey was not feasible. This fact leads to some limitations in the data analyses. The questions were not designed and asked by our group, so the meaning might have been interpreted in a slightly different way, than was intended by the European Commission. To prevent misunderstandings we only used those items of the dataset, the meaning of which was obvious to us, but misinterpretation cannot be ruled out.

The issues which have been raised in the survey were very complex and some of them are difficult to explain using dichotomous questions. The preparation of guidelines is a good example. Information on the general applicability of these guidelines remains unanswered in such a survey. A more qualitative approach is needed to answer such questions. The affirmation by countries to complex questions, like the application of enhanced surveillance, can provide information on the fact that health authorities are aware of the need for such measure yet it does not give a clue on the quality of the applied measure.

The whole data set comprises 96 questions. This comprehensive questionnaire was sent to national health authorities with the request to reply within two days. It is likely, that this time period was too short to answer the questions in an appropriate way. The asked questions cover a range of areas involved in the control of SARS. Due to the different public health components, like surveillance or communication of community containment measures, which were asked for in the survey, the questioning of different national public health experts would be more useful to obtain precise information. The limited time period makes a detailed questioning of responsible persons unlikely. The facts that many questions have not been answered in the survey support the assumption that the contacted persons were not qualified to reply to all questions.

The survey was conducted in September 2003, two months after the SARS outbreak was declared to be over. Therefore, the awareness of an international disease outbreak was still in mind. Whether the current outbreak preparedness is on the same level as during the survey is unclear. The preparedness of control strategies shortly after the outbreak might be on a higher
level as in the current inter-epidemic period. On the other hand, some countries might have improved their response to infectious disease through the experience gained from the SARS outbreak.

**Conclusions**

The survey shows, that the EU member states responded differently in certain areas to the threat of a pandemic infection.

A coordinated approach in response to an internationally spreading disease is needed to ensure that the EU member states act effectively together. Health care is organised under national law. Therefore, nations decide about their national policies and international institutions can offer help and recommendation but become active only if their help is requested for [45]. The ECDC is one institution, which could play a major role in the coordination of European control strategies. While the ECDC has no legal authorization to support European countries in their health policies, but assistance from an institution with international confidence and the expertise to support countries could be accepted from most member states. The ECDC has started functioning and its influence will gain importance over time. However, Europe has a federal system which comprises the variety of health systems of its member states. Different European health networks and expert teams to support countries in health affairs have been developed. To maintain a response which reflects the diverse national approaches these networks have to endure, even if the ECDC is full functioning. A European health centre cannot replace the evolved structure, but it can make it parts work together efficiently.

**Future research**

This quantitative survey can only give a descriptive overview of the situation during and after the SARS epidemic. A more qualitative approach is necessary to analyse the impact of public health policy in preventing spread of infectious diseases. Strengths and weaknesses of public health policies have to be analysed, to give recommendations to public health authorities. The individual situation of each country has to be kept in mind while developing recommendations to ensure that they are applicable. The Hazard Analyses of Critical Control
Points (HACCP), will be conducted in the SARSControl project and provide additional information.
References


4 Singh D. New infectious diseases will continue to emerge. BMJ 2004;328:186


10 European Canter for Prevention and Disease Control (ECDC); Homepage: http://www.ecdc.eu.int/


12 Watson R. Combating the free movement to micro-organisms. BMJ 2005;331:986


43 Parry J. Breaches of safety regulations are probable cause of recent SARS outbreak, WHO says. BMJ 2004;328:1222