Evaluation of the notifiable disease surveillance system in Gauteng Province, South Africa

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Introduction

• An effective health system is characterised by services that meet the health care needs of the population it serves
• Sound health information systems are critical to measure the population’s needs and to monitor system performance
• Notifiable disease surveillance is the basis of ongoing data collection, collation and analysis of priority diseases within a geographic area guiding public health planning and interventions
The Disease Notification System in South Africa

- The system covers both public and private sectors in all nine provinces of South Africa
- It is administered by public sector organs at all three tiers of government: National DoH, Provincial DoH and District Health authorities
- The legislative basis for disease notifications is the National Health Act (Act 61, 2003); new regulations on notifiable diseases are currently under development
- All national disease surveillance systems need to comply with the requirements of the new International Health Regulations (IHR) with the final deadline being the year 2012
- 33 medical conditions are notifiable in South Africa
The Notification Process in SA

- **Health-related event**
  - **Detection**
    - Local community level or primary
      public health response level (*District*)
      - **Preliminary control measures**
    - **Reporting**
      - **Investigation and additional control measures**
      - Intermediate public health response level (*Provincial*)
    - **Reporting**
      - **Formal assessment, containment and control measures**
      - National level
        National IHR focal point
  - **National level National IHR focal point**
    - **Reporting/Notification**
      - WHO IHR focal point
      - **Recommendations and other control measures**

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Purpose of Disease Notifications

- Vigilance for vaccine preventable illnesses
- Identification of epidemic-prone diseases for prompt public health response
- Monitoring of zoonotic diseases to prompt appropriate intersectoral responses (agriculture, health, trade and industry)
- Prevention of congenitally acquired infections
- Cholera, plague and yellow fever are mandatory reportable conditions to the World Health Organisation as specified in the International Health Regulations of 1969
- Monitoring of health programmes and interventions
Gauteng Province

- Gauteng is the economic hub of South Africa
- The population estimate for 2006 is approximately 9.5 million (20.1% of the national population)
- The province has a high population density of 476 people per square kilometre rendering it vulnerable to communicable diseases
- There is a high rate of population migration both internally across its borders
- The OR Tambo International Airport is the busiest airport in Africa with a documented arrival of 100 258 passengers between April 2005 and March 2006 and the potential for importation of infected individuals, disease vectors or pathogens through air travel
Research Objectives

This evaluation was conducted with the purpose of describing the state of the notifiable disease surveillance system in Gauteng Province indicating how well the system was operating in 2006 to meet its purpose and objectives.
Methods

• Setting: the notifiable disease surveillance system, Gauteng Provincial component
• This study was based on the data and information collected in the 6-month period from 1 January to 30 June 2006
• As an evaluation study this research consisted of both the qualitative aspects and quantitative descriptive components of the notifiable disease system in Gauteng Province
• Subjects: Gauteng Health Department’s disease surveillance system participants; public and private sector health care providers including private primary health care practitioners; and laboratory-diagnosed and reported patients with malaria
• Methods were based on the CDC “Updated Guidelines for Evaluating Public Health Surveillance Systems”
Methods: Qualitative

- This aspect consisted of semi-structured interviews with representatives of provincial and district communicable disease control offices.
- Inputs were sought from key role players in the Department of Health.
- The surveillance system attributes on which data were collected consisted of:
  - level of usefulness; simplicity; flexibility; data quality; acceptability; sensitivity; positive predictive value; representativeness; and stability.
- Qualitative interview data were coded and triangulated with documented evidence of system performance.
Methods: Quantitative

- Two quantitative assessments were conducted.
- A cross-sectional telephonic survey was conducted on knowledge and practice of disease notifications on a random sample of primary health care providers in the private sector in the Gauteng Province.
- A secondary data analysis compared malaria notifications with laboratory (National Health Laboratory Service and private pathology laboratories) and National Institute of Communicable Diseases surveillance data to quantify under-reporting of malaria as a case study of notifiable conditions.
Results: Qualitative

- The structure of the notifiable disease surveillance system contains parallel lines of reporting resulting in duplication of data and resources
- Flow diagrams are available for reporting of notifiable diseases within all geographic surveillance districts
- The flexibility of the system is tested when changing the official national notification list and it proved to be cumbersome in the past
- New subtype human influenza is now reportable (as of September 2006)
- Since the reporting process was paper-based and not electronic yet, adjustments required reissuing of disease notification guidelines to all health care providers
Results: Quantitative

Completeness of reporting of meningococcal meningitis case patient residential addresses

<table>
<thead>
<tr>
<th>District</th>
<th>Total number of cases of meningococcal disease on line listing</th>
<th>Number of line list entries with blank/insufficient residential data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johannesburg Metro</td>
<td>104</td>
<td>30 (29%)</td>
</tr>
<tr>
<td>Ekurhuleni Metro</td>
<td>28</td>
<td>16 (57%)</td>
</tr>
<tr>
<td>Tshwane Metro</td>
<td>19</td>
<td>7 (37%)</td>
</tr>
<tr>
<td>Sedibeng</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>
Results: Private practitioner survey

- The private sector primary health care provider survey was conducted over a period of six weeks
- 69 private practitioners were interviewed (response rate was 18.4%)
- The majority of the non-responses (299) were due to unavailability of the practitioner at the times that calls were made
- 37% (n=26) of respondents stated that they always reported cases of notifiable conditions seen at their practices to the department of health
- 28% (N=19) of respondents reported having a notification book present in their practice
- The commonest reasons cited for not consistently reporting cases were the assumption that facilities to which patients with such conditions were referred would notify them (10/69) and that the notification process was too cumbersome (9/69)
Results: Private practitioner survey

Figure 4.2 Participant responses on knowledge about notifiable diseases
Results: Private practitioner survey

Frequency distribution of response scores on knowledge of notifiable diseases
Results: Private practitioner survey

Scatter plot of number of years since graduation against percentage of conditions correctly identified
Results: Private practitioner survey

Private practitioners’ communications access

<table>
<thead>
<tr>
<th>Service</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land line telephone</td>
<td>68</td>
<td>99%</td>
</tr>
<tr>
<td>Cellular Phone</td>
<td>57</td>
<td>83%</td>
</tr>
<tr>
<td>Internet access at practice</td>
<td>46</td>
<td>67%</td>
</tr>
<tr>
<td>Fax machine at practice</td>
<td>64</td>
<td>93%</td>
</tr>
</tbody>
</table>
Results: Malaria Notifications

Table: Malaria diagnoses and notifications: sample characteristics

(January to June 2006)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gauteng Notifications</th>
<th>NHLS diagnoses</th>
<th>NICD clinical surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of malaria cases</td>
<td>1600</td>
<td>4679</td>
<td>1508</td>
</tr>
<tr>
<td>Age distribution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 5 years</td>
<td>236 (14.8%)</td>
<td>512 (10.9%)</td>
<td>231 (15.3%)</td>
</tr>
<tr>
<td>5 to 20 years</td>
<td>328 (20.5%)</td>
<td>663 (14.2%)</td>
<td>273 (18.1%)</td>
</tr>
<tr>
<td>21 to 40 years</td>
<td>819 (51.2%)</td>
<td>2189 (46.8%)</td>
<td>689 (45.7%)</td>
</tr>
<tr>
<td>Over 40 years</td>
<td>190 (11.9%)</td>
<td>546 (11.7%)</td>
<td>214 (14.2%)</td>
</tr>
<tr>
<td>Age not reported</td>
<td>27 (1.7%)</td>
<td>769 (16.4%)</td>
<td>101 (6.7%)</td>
</tr>
<tr>
<td>Sex distribution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>493 (30.8%)</td>
<td>1340 (28.6%)</td>
<td>479 (31.8%)</td>
</tr>
<tr>
<td>Male</td>
<td>1094 (68.4%)</td>
<td>2917 (62.3%)</td>
<td>1023 (67.8%)</td>
</tr>
<tr>
<td>Sex not documented</td>
<td>13 (0.8%)</td>
<td>422 (9.0%)</td>
<td>6 (0.4%)</td>
</tr>
</tbody>
</table>
Results: Malaria Notifications

National Health Laboratory Service data: malaria cases diagnosed by week from January to May 2006
Results: Malaria Notifications

Absolute numbers of malaria cases documented through different sources (not species-specific)
Results: Malaria Notifications

<table>
<thead>
<tr>
<th></th>
<th>Laboratory Database</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National Health Laboratory Service</td>
</tr>
<tr>
<td>P. falciparum</td>
<td>4214</td>
</tr>
<tr>
<td>P. ovale</td>
<td>10</td>
</tr>
<tr>
<td>P. vivax</td>
<td>6</td>
</tr>
<tr>
<td>P. malariae</td>
<td>4</td>
</tr>
<tr>
<td>Mixed infection</td>
<td>15</td>
</tr>
<tr>
<td>Not specified</td>
<td>414 (30 antigen-negative)</td>
</tr>
</tbody>
</table>
## Results: Malaria Notifications

<table>
<thead>
<tr>
<th></th>
<th>Laboratory diagnosis</th>
<th>Laboratory diagnosis</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases notified</td>
<td>26</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>Cases not notified</td>
<td>74</td>
<td>0</td>
<td>74</td>
</tr>
<tr>
<td>Totals</td>
<td>100</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Sensitivity = cases notified / “gold standard” number of cases = 26/100 = 26%

(95% confidence interval 17.4 to 34.5%).
Discussion

• The list of notifiable conditions in South Africa has remained relatively constant since the regulations to the Health Act in 1977 and requires careful periodic review.
• Current and explicit case definitions are necessary to clarify what should be reported.
• This research revealed contradictory views about the usefulness of the notifiable disease surveillance system.
• Feedback sessions are held monthly within the public sector in Gauteng between the provincial and local health departments and public sector facilities; such interaction is lacking between the public and private sectors and this may result in lack of communication.
Discussion

• The province should be monitoring compliance with notifications on a checklist.
• The malaria cases reports have been consistent with pre-existing epidemiological assumptions about imported malaria infections with regard to distribution of cases by demographic characteristics but total case numbers have been under-reported.
Recommendations

1. Evaluation of the notifiable disease surveillance system at regular intervals (the results of this research could be used as a baseline for such assessments)
   - incorporate supplementary data sources
   - explore integration of datasets to eliminate duplication
   - external validation of evaluation methods

2. Planning for human resources for health should take cognisance of the need for adequate and skilled personnel.

3. Training and support of reporters of notifiable diseases in both the public and private sector. Incorporation of notifiable disease reporting as a theme in continued medical education programmes may be effective in raising awareness and competency amongst medical professionals.
Recommendations

5. Improvement of private practitioner compliance with notifiable disease reporting
   - Regular bidirectional communication should be maintained between the public sector notification system components and private general practitioners
   - A software programme with automated notification alerts linked to ICD-codes and additional information such as contact details of communicable disease control offices

6. Dissemination of the results and interpretation of notification data should be published and available to a wider audience of health care providers with elucidation on how it has influenced responses to outbreaks or been used to assess health interventions

7. Frequent and timely feedback is essential
Professor Maila John Matjila supervised this research and Dr Bernice N Harris co-supervised and both provided sustained guidance and critical review throughout the planning and execution of this research.

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