TECHNICAL REPORT:
The Impact of Primary Healthcare Development on Patterns of Hospitalization: The Case of Integrated Management of Childhood Illness (IMCI) in Karaganda City, Kazakhstan

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# Table of Contents

I. Executive Summary ...................................................................................................................... 2
II. Introduction ..................................................................................................................................... 1
III. Objectives of the Study ................................................................................................................ 1
IV. Intervention: Implementation of the IMCI Strategy in Kazakhstan ............................................. 2
V. Study Design .................................................................................................................................. 2
   A. Methods ......................................................................................................................................... 3
   B. Study Sites and Data Sources ...................................................................................................... 5
   C. Limitations of the Study ............................................................................................................... 6
VI. Results .......................................................................................................................................... 7
   A. Total Hospitalization Rates for Children Under 5 ........................................................................ 7
   B. Hospitalization Rates for ARI and CDD for Children Under 5 ................................................... 8
   C. Adjusted Relative Rates of Hospitalization for Children Under 5 .............................................. 11
   D. Costs of Avoidable Hospitalization .......................................................................................... 14
VII. Discussion ................................................................................................................................. 14
   A. Organization of Service Delivery ................................................................................................. 15
   B. Economic Incentives ................................................................................................................... 15
   C. Household Knowledge, Attitudes, and Behavior ....................................................................... 16
VIII. Conclusions ............................................................................................................................. 17
References .......................................................................................................................................... 18
Appendix 1: List of ICD-10 Codes and Diagnoses for ARI and CDD .................................................. 19
Appendix 2: Summary of the IMCI Strategy ...................................................................................... 22
   A. Clinical Guidelines and Improving Clinical Skills ....................................................................... 22
   B. Strengthening the Health System to Support IMCI ................................................................... 22
   C. Improving Family and Community Health Practices ................................................................ 23
I. Executive Summary

Although health reform efforts have led to improvements in the primary health care sector in Kazakhstan, the health care system continues to be characterized by an imbalance between primary and specialty care, particularly hospitalization. In addition to the inefficiency created by the dominance of the hospital sector in the health care system, excess hospitalization also contributes to poor quality and discontinuity of care, increased risk of hospital infections, and economic and psychological hardship for patients and their families.

This study uses the example of the implementation of the WHO Integrated Management of Childhood Illness (IMCI) strategy in Karaganda City, Kazakhstan to analyze whether costly avoidable hospitalization may be reduced if the primary health care sector is strengthened through updated clinical training, appropriate equipment and supplies, and evidence-based or internationally accepted clinical protocols and referral guidelines. To estimate reductions in avoidable hospitalization, this study analyzes hospitalization patterns for conditions for which hospitalization can usually be avoided if ambulatory care is provided in a timely and effective manner, in this case childhood acute respiratory infection (ARI) and childhood diarrheal disease (CDD).

Population-based hospital admission rates are compared for the one-year period before IMCI was introduced and for the one-year period after implementation was initiated. This study exploits the phased-in implementation of IMCI in Karaganda, using a before-and-after analysis of relative rates of hospital admission in an intervention site, where the IMCI strategy was initiated and has been ongoing for one year, and in a comparison site, where the IMCI strategy has not yet been implemented. Adjusted relative rates are used to control for underlying differences in hospitalization rates between the intervention and comparison sites that are unrelated to the IMCI intervention.

The results of the study show that hospitalization of children under five in general, and for ARI and CDD in particular, increased in both the intervention and comparison sites over the study period. The increase was greater in absolute and relative terms, however, in the comparison site without the IMCI intervention. The results were presented to an expert panel of health policymakers and physicians in Karaganda City for validation and interpretation. The experts concluded that the slower growth of hospitalization in the intervention site can be attributed at least partially to the introduction of the IMCI strategy. Nonetheless, the rate of hospitalization increased in both sites during the study period, and thus, the expert panel concluded that the implementation of IMCI can only have a limited impact on pediatric hospitalization without more fundamental changes in the organization of service delivery, the incentives in the health care system, household economic constraints, and the knowledge, attitudes and behavior of the community related to the management of childhood illnesses.

The results of this study were seen as positive evidence of the successful introduction of IMCI, particularly in view of early predictions made by Karaganda health policymakers and representatives from WHO that the intervention may take at least two years to show any effect on hospitalization in urban areas. In addition, the conclusions of the study support the WHO position that IMCI should be implemented as a three-component strategy addressing case-management skills, health system improvements, and family and community practice improvements. Inadequate emphasis on any one of the components will reduce the overall impact of the IMCI strategy. Obstacles to achieving reductions in avoidable hospitalization from the implementation of IMCI remain in Karaganda, and continued support of the health system and community components of the IMCI strategy is necessary. Furthermore, the comprehensive health system development process must continue in Karaganda to continue to change the economic incentives that favor hospital care over primary care, and to reduce the administrative constraints to managing more illnesses at the primary health care level.
II. Introduction

Although health reform efforts have led to improvements in the primary health care sector in Kazakhstan, the health care system continues to be characterized by an imbalance between primary and specialty care, particularly hospitalization. The structure of the delivery system, the financial incentives inherent in the historical budgeting process, and the expectations of providers and patients about the type of care provided all conspire to maintain this imbalance in favor of hospital care over primary care. Hospitals continue to receive the vast majority of resources, and hospitalization rates and average lengths of stay remain high. In addition to the inefficiency created by the dominance of the hospital sector in the health care system, excess hospitalization also contributes to poor quality and discontinuity of care, increased risk of hospital infections, and economic and psychological hardship for patients and their families. Avoidable hospitalization poses an unnecessary burden on both patients and the health care system.

One of the goals of health sector reform in Kazakhstan is to shift a larger share of diagnosis, treatment, and case management to the more cost-effective primary health care setting and reduce avoidable hospitalization. The objective is to achieve higher quality care that is more accessible, continuous, and appropriate, with the result of greater improvements in health outcomes given the limited resources available. In order to shift service delivery to the primary care setting, many of the current constraints on primary care providers must be reduced. For example, clinical skills must be strengthened, basic equipment and supplies provided, clinical protocols and referral guidelines must be updated, and there should be both physical and economic access to essential outpatient drugs. The Government of Kazakhstan has stated that strengthening the primary health care sector is a goal of health care system development, and much progress has been made. The existing constraints on the primary care sector, however, continue to make it difficult for health reforms to reach their full potential.

In order to guide further policy development, evidence is needed about the capability of the primary health care sector to assume a greater share of service delivery, and the expected impact on hospitalization, and ultimately health status. This study uses the example of the implementation of the WHO Integrated Management of Childhood Illness (IMCI) strategy in Karaganda City, Kazakhstan to analyze whether and under what conditions costly avoidable hospitalization may be reduced if the primary health care sector is strengthened through updated clinical training, appropriate equipment and supplies, and evidence-based or internationally accepted clinical protocols and referral guidelines.

III. Objectives of the Study

The first objective of this study is to estimate the potential reduction in avoidable hospitalization of children under five if the appropriate conditions are in place in the primary health care sector to carry out the IMCI strategy. It is hypothesized that if the appropriate conditions are provided in the primary health care sector, the quality of diagnosis, treatment, and management of childhood illnesses will improve. In addition, utilization of primary care services will increase, because the population will perceive an increase in the value of primary care clinics. The increased utilization of primary care combined with more and better services available should lead to a reduction in avoidable hospitalization.

Evidence from the literature shows that interventions such as those that are part of the IMCI strategy can have an impact on improving the primary care process in some contexts. For example, in-service clinical training has been shown to significantly improve the management of children with ARI and diarrhea. Bojalil et al. (1999) found that after a five-day in-service training course on diagnosing and treating childhood illness in Mexico, the number of public physicians correctly diagnosing ARI increased by 28 percent. Furthermore, Perkins et al. (1997) found that health workers using the IMCI guidelines in western Kenya could correctly identify over 90 percent of the cases of pneumonia, malaria, malnutrition,
and anemia that had been diagnosed by an expert pediatrician using hemoglobin tests, blood smear examination and chest X-rays. Boulanger et al. (1999) found that health workers in Kenya who did not use IMCI guidelines identified only 65 percent of illnesses that were detected by clinicians who then examined the same children using the IMCI guidelines. Using the IMCI guidelines particularly improved the detection and identification of anemia, pneumonia and diarrhea. Research demonstrating the link between improved primary care practice and reduced hospitalization, however, is lacking.

The second objective of this study is to obtain an estimate of the potential savings to the health care system and to individuals of strengthening the PHC sector through implementation of the IMCI strategy and reducing avoidable hospitalization. Boulanger et al. (1999) show that using IMCI clinical guidelines in rural health facilities in Kenya would have resulted in an overall reduction in the cost of drugs used to treat childhood illnesses of between 12 and 65 percent relative to actual prescribing practices. Total drug costs to treat 757 children using IMCI guidelines were lower even though the IMCI guidelines detected more illnesses (2,068 relative to 1,335 detected without using IMCI guidelines). Estimates of savings generated by reduced hospitalization as a result of IMCI implementation, however, are not found in the literature.

IV. Intervention: Implementation of the IMCI Strategy in Kazakhstan

The Integrated Management of Childhood Illness strategy is aimed at reducing child morbidity and mortality by combining improved management of common childhood illnesses (pneumonia, diarrhea, malaria, measles, ear problems, and anemia) with proper nutrition and immunization. The strategy, which is targeted to children between the ages of one week and five years, combines guidelines for the integrated management of childhood illnesses at the level of primary health care with activities to improve the skills of health care workers, strengthen the health system to support IMCI, and improve family and community health practices. As of June 1999, 63 countries had begun using the IMCI strategy (Rowe et al. 1999). Please see Appendix 2 for a more detailed summary of the elements of the IMCI strategy.

In July 1997, Kazakhstan was selected as the pilot country for IMCI in Central Asia. One of the key goals of this pilot project was to introduce the IMCI strategy in areas where health reforms were ongoing. In 1999, the IMCI strategy was introduced in two pilot sites in Kazakhstan, supported by the World Health Organization (WHO), the USAID-funded ZdravPlus Program, and UNICEF. The World Bank has also joined in the support of IMCI implementation. The strategy was first piloted in Semipalatinsk City and two adjacent rural districts. The IMCI strategy is currently being piloted in five different regions in Kazakhstan.

In July 2001, Karaganda Oblast began implementation of IMCI in three rural rayons (Bukharzhirau, Karkaraln, and Osakarov), and four urban areas (Yugo-Vostok and Maikuduk microdistricts of Karaganda City, Zhezkazgan City and Satpayev City). Clinical protocols recommended by WHO and approved at the national level were introduced in the IMCI sites, and health care providers were trained in the new treatment protocols. Since July 2001, 215 pediatricians, feldshers and nurses have been trained by national level IMCI trainers trained, including all 30 pediatricians in the seven PHC practices in Maikuduk.

V. Study Design

The principal hypothesis of the study is that hospitalization patterns for children in geographic areas where the IMCI strategy is adopted and supported by the necessary resources and appropriate policies will be different than in areas not yet adopting the IMCI strategy. In particular, it is hypothesized that overall hospitalization for children under five will decrease more, or increase less, in the intervention site.
after the introduction of IMCI relative to a comparison site. It is further hypothesized that hospitalization of children under five specifically for acute respiratory infection and diarrheal disease, conditions targeted by IMCI, will decrease more, or increase less, in the intervention site than in the comparison site. In addition, if more childhood illnesses are managed in the primary care setting, it may be expected that the case-mix for those that are hospitalized may become more severe. Therefore, this study will also analyze changes in average length of stay and case-mix to test the hypothesis that hospital cases for children under five will become more severe as a larger share of cases are managed in the primary care setting.

A. Methods

1. Analysis of Change in Hospitalization Patterns

This study uses a before-and-after analysis of relative rates of hospital admission for children under five in an intervention site, where the IMCI strategy was initiated and has been ongoing for one year, and in a comparison site, where the IMCI strategy has not yet been implemented. Population-based hospital admission rates are compared for the one-year period before IMCI was introduced (July 2000 to June 2001) and for the one-year period after implementation was initiated (July 2001 to June 2002). Underlying differences in overall hospitalization rates may be related to the IMCI intervention, but they may also be related to differences in socioeconomic status, distance to the nearest referral hospital, or other factors that may not be observable. In order to control for any underlying differences in overall hospitalization rates between the intervention and comparison sites, adjusted relative rates are used (Weissman et al., 1992).

To estimate reductions in avoidable hospitalization, this study uses a “sentinel condition” approach, which analyzes hospitalization patterns for conditions for which hospitalization can usually be avoided if ambulatory care is provided in a timely and effective manner (Weissman et al. 1992). The sentinel conditions identified for this study are childhood acute respiratory infection (ARI) and childhood diarrheal disease (CDD). Diagnoses and corresponding ICD-10 codes for illnesses related to ARI and CDD were identified by a team of local physicians and used to restrict the sample for the sentinel condition analysis (please see Appendix 1 for the list of diagnoses included in the study). Because IMCI is by definition an integrated intervention, changes in hospitalization for conditions other than ARI and CDD may also result from overall better management of child health in the intervention sites. Therefore, in addition to hospital cases for which ARI or CDD is the primary diagnosis, differences in overall hospitalization for children under five are also analyzed in this study. No attempt was made for this study to determine whether hospitalizations were appropriate or inappropriate based on the diagnosis, because that was not the main purpose of the study, and differing opinions remain among local specialists about which cases should be hospitalized.

There are four main outcome variables for this component of the study:

(1) Relative rate of hospitalization for children under five:

\[
RRH = \frac{HC_i}{TC_i} \times \frac{HC_c}{TC_c}
\]

where,

\[
RRH = \text{relative rate of hospitalization for children under 5}
\]

\[
HC_i = \text{total number of hospital cases for children under 5 in the intervention site}
\]
TC\textsubscript{i} = total number of children under 5 in the intervention site

HC\textsubscript{c} = total number of hospital cases for children under 5 in the comparison site

TC\textsubscript{c} = total number of children under 5 in the comparison site

(2) Adjusted relative rate of hospitalization for children under 5:

\[
ARRH = \frac{RRH}{\left(\frac{HC\textsubscript{pi} - HC\textsubscript{c}}{TC\textsubscript{pi} - TC\textsubscript{c}}\right) \left(\frac{HC\textsubscript{pc} - HC\textsubscript{c}}{TC\textsubscript{pc} - TC\textsubscript{c}}\right)}
\]

where,

ARRH = adjusted relative rate of hospitalization for children under 5

RRH = relative rate of hospitalization for children under 5

HC\textsubscript{pi} = total number of hospital cases for all population groups in the intervention site

HC\textsubscript{i} = total number of hospital cases for children under 5 in the intervention site

TC\textsubscript{pi} = total population in the intervention site

TC\textsubscript{i} = total number of children under 5 in the intervention site

HC\textsubscript{pc} = total number of hospital cases for all population groups in the comparison site

HC\textsubscript{c} = total number of hospital cases for children under 5 in the comparison site

TC\textsubscript{pc} = total population in the comparison site

TC\textsubscript{c} = total number of children under 5 in the comparison site

(3) Relative rate of hospitalization for children under five for the sentinel conditions (acute respiratory infection and diarrheal disease):

\[
RRH\textsubscript{j} = \left(\frac{HC\textsubscript{i,j}}{TC\textsubscript{i}}\right) \left(\frac{HC\textsubscript{c,j}}{TC\textsubscript{c}}\right)
\]

where,

RRH\textsubscript{j} = relative rate of hospitalization for children under 5 for sentinel condition j

(j = ARI or CDD)
The Impact of Primary Healthcare Development on Patterns of Hospitalization: The Case of IMCI in Karaganda

\[ HC_{ij} = \text{total number of hospital cases for children under 5 for sentinel condition } j \text{ in the intervention site} \]

\[ TC_i = \text{total number of children under 5 in the intervention site} \]

\[ HC_{cj} = \text{total number of hospital cases for children under 5 for sentinel condition } j \text{ in the comparison site} \]

\[ TC_c = \text{total number of children under 5 in the comparison site} \]

(4) Adjusted relative rate of hospitalization for children under five for the sentinel conditions (acute respiratory infection and diarrheal disease):

\[
ARRH_j = \frac{RRH_j}{\left( \frac{HC_{pi} - HC_i}{TC_{pi} - TC_i} \right) \left( \frac{HC_{pc} - HC_c}{TC_{pc} - TC_c} \right)}
\]

2. Analysis of Costs of Avoidable Hospitalization

Estimates are made of the cost per case for all pediatric hospital admissions, and for hospital admissions related to ARI and CDD using two different approaches. First, the cost per hospital case is estimated using actual expenditures by the hospital for these cases estimated through a standard step-down cost-accounting methodology. Next, the cost per case is estimated using the amount that the Oblast Health Department reimburses hospitals for these cases, which may be more or less than actual expenditures. The total cost per hospital case estimates are combined with estimates of the potential reduction in pediatric hospital cases using the IMCI strategy to generate an estimate of total savings in the study area that may be potentially realized by shifting the management of childhood illnesses to the primary care setting.

B. Study Sites and Data Sources

The study was conducted in two urban microdistricts of Karaganda City, Kazakhstan. The IMCI strategy was implemented in the intervention site, Maikuduk, beginning in July 2001. During the period of the study, the IMCI strategy was not yet introduced in the comparison site, Prishakhtinsk. The two microdistricts were selected, because they are considered to be similar in population size and age distribution, distance from Karaganda City center, socioeconomic status, and illness and hospitalization patterns. The two microdistricts are approximately twenty kilometers from each other and twenty kilometers from the Karaganda City center. The children’s hospital in Maikuduk serves as the main referral center for children from both regions, so it is expected that children from Maikuduk may have a higher underlying probability of hospital referral, all else being equal, because of the close physical proximity of the hospital to the population. The population structure and hospitalization rates for both microdistricts for the year 2000 are presented in Table 1.
Table 1. Description Data for Study Sites in 2000

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Maikuduk (intervention site)</th>
<th>Prishakhtinsk (comparison site)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>111,801</td>
<td>58,509</td>
<td>170,310</td>
</tr>
<tr>
<td>Total number (%) of children &lt;5</td>
<td>7,222 (6.46)</td>
<td>4,006 (6.85)</td>
<td>11,228 (6.59)</td>
</tr>
<tr>
<td>Total number of hospital admissions</td>
<td>21,431</td>
<td>9,610</td>
<td>31,041</td>
</tr>
<tr>
<td>Hospitalization rate (# hospital admissions/ 100 people)</td>
<td>19.2</td>
<td>16.4</td>
<td>18.2</td>
</tr>
<tr>
<td>Total number of hospital admissions for children &lt;5</td>
<td>2,674</td>
<td>1,181</td>
<td>3,855</td>
</tr>
<tr>
<td>Hospitalization rate for children &lt;5</td>
<td>37.0</td>
<td>29.5</td>
<td>34.3</td>
</tr>
</tbody>
</table>

The main data source for this study is the Karaganda Health Department Health Information Center (Densaulyk) hospital case database. The hospital case database, which is used for billing and reimbursement for all government financed hospital cases, contains information on the characteristics of the patient (age, gender, exemption status), the diagnosis, and the characteristics of the hospital stay, such as the length of stay, the department of admission/discharge, whether a surgery was performed, whether the patient was in intensive care, and the result of the admission (discharge, transfer, death). The patient address information in the hospital case database allows identification of all hospital cases throughout the city for children residing in Maikuduk and Prishakhtinsk microdistricts.

The cost data to estimate actual expenditure per hospital case was generated from an analysis of the budget and financial reports of the children’s hospital in Maikuduk, which accounts for about 50 percent of the hospital cases for children residing in Maikuduk and Prishakhtinsk, the oblast children’s hospital, and the oblast infectious disease hospital. Documentation for the hospital payment system of the Oblast Health Department is used to obtain average reimbursement rates for all pediatric cases, and ARI/CDD cases.

C. Limitations of the Study

The limitations of the study are typical of any community experimental study. Many factors other than those related to the IMCI intervention may have affected the patterns of hospitalization in the intervention and comparison sites over the study period, even controlling for external factors through adjusted relative rates of hospitalization. Therefore, it is not possible to establish causality, and differences in hospitalization patterns observed cannot be unequivocally attributed to the IMCI intervention. The results provide a descriptive analysis that must be interpreted carefully with the aid of additional information from health sector leaders and providers in Karaganda.

A further limitation is that the study was completed only one year after IMCI was introduced in the urban intervention site. Karaganda health sector leaders and WHO representatives predicted that whereas IMCI may have an effect on hospitalization early on in implementation in rural areas in Karaganda Oblast, the intervention may take at least two years to reduce hospitalization in the urban areas. The specialists predicted that hospitalization may actually increase in the intervention site immediately following the introduction of IMCI, as primary care physicians become more aware of childhood illnesses and more actively engage in case identification, but do not yet have the confidence to refer less to hospitals.
VI. Results

A. Total Hospitalization Rates for Children Under 5

As shown in Table 2 and Figure 1 below, hospital admissions for children under five, already high by international standards, increased substantially between the pre-IMCI period (July 2000 to June 2001) and the post-IMCI period (July 2001 to June 2002) in both the intervention and comparison site.

### Table 2. Total Hospitalization Rates for Children <5

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Maikuduk (intervention site)</th>
<th>Prishakhtinsk (comparison site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of children &lt;5</td>
<td>Pre-IMCI 8,261</td>
<td>Post-IMCI 8,523</td>
</tr>
<tr>
<td></td>
<td>Pre-IMCI 3,301</td>
<td>Post-IMCI 2,831</td>
</tr>
<tr>
<td>Total # of hospital cases for children &lt;5</td>
<td>2,795</td>
<td>3,941</td>
</tr>
<tr>
<td></td>
<td>Pre-IMCI 916</td>
<td>Post-IMCI 1,275</td>
</tr>
<tr>
<td>Hospitalization rate</td>
<td>33.8</td>
<td>46.2</td>
</tr>
<tr>
<td>(hospital admissions/ 100 children)</td>
<td>Pre-IMCI 27.8</td>
<td>Post-IMCI 45.0</td>
</tr>
</tbody>
</table>

The increase was greater in both absolute and relative terms, however, in the comparison site Prishakhtinsk, where hospitalization increased by 62 percent (from 27.8 to 45.0 per 100 children). In Maikuduk the hospitalization rate increased by 37 percent (from 33.8 to 46.2 per 100 children).

Figure 1. Total Hospitalization Rates for Children <5 Before and After the Introduction of IMCI

Quarterly data in Figure 2 show that trends in hospitalization of children under five have been similar in both the intervention and comparison site since the first quarter of 2000. Hospitalization was rising steadily in both sites before the introduction of IMCI, then declined in both sites after the third quarter of 2001, which coincides with the beginning of IMCI implementation in July 2001. Hospitalization rates are currently on the rise again in both sites. The quarterly data also show that an unusually high rate of hospital admissions are observed in Prishakhtinsk in the third quarter of 2001, which strongly affects the post-IMCI average rate. Thus, the lower hospitalization rate for children under five observed in Maikuduk in the post-IMCI period is largely driven by the spike in hospitalization in Prishakhtinsk in one quarter and does not necessarily reflect a difference related to the implementation of IMCI.
B. Hospitalization Rates for ARI and CDD for Children Under 5

The combined hospitalization rates for the sentinel conditions ARI and CDD are shown in Table 3. Hospitalization rates for these conditions were higher in Maikuduk than in Prishakhtinsk prior to the implementation of IMCI, with rates of 12.5 and 8.9 per 100 children per year, respectively. Although the hospitalization rates increased in both sites following the initiation of IMCI, the increase was smaller in the intervention site (1.4/100) than in the comparison site (2.5/100).

Table 3. Hospitalization Rates for Children <5 for ARI and CDD

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Maikuduk (intervention site)</th>
<th>Prishakhtinsk (comparison site)</th>
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</tr>
<tr>
<td></td>
<td>Pre-IMCI 3,301</td>
<td>Post-IMCI 2,831</td>
</tr>
<tr>
<td># of hospital cases for ARI/ CDD</td>
<td>1,033</td>
<td>1,188</td>
</tr>
<tr>
<td>ARI only</td>
<td>764</td>
<td>892</td>
</tr>
<tr>
<td>CDD only</td>
<td>269</td>
<td>296</td>
</tr>
<tr>
<td>% of hospital cases for ARI and CDD</td>
<td>37.0</td>
<td>30.1</td>
</tr>
<tr>
<td>ARI only</td>
<td>27.3</td>
<td>22.6</td>
</tr>
<tr>
<td>CDD only</td>
<td>9.6</td>
<td>7.5</td>
</tr>
<tr>
<td>Hospitalization rate for ARI and CDD</td>
<td>12.5</td>
<td>13.9</td>
</tr>
<tr>
<td>(hospital admissions/ 100 children)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARI only</td>
<td>9.2</td>
<td>10.5</td>
</tr>
<tr>
<td>CDD only</td>
<td>3.3</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Total hospital cases for children increased at a faster pace than ARI/CDD hospital cases, so as shown in Figure 3, hospital cases for ARI/CDD as a percentage of all hospital cases declined by about seven percent in both sites during the study period.
The average length of hospital stay (ALOS) declined in both sites, and thus the hypothesis of a more severe case-mix for hospital cases for children under five in the intervention site is not supported. As Figure 4 shows, ALOS for hospital cases for children under five decreased by 0.75 days in Maikuduk and by 1.59 days in Prishakhtinsk. The ALOS for ARI/CDD cases decreased by 0.15 days in the intervention site and by 0.40 days in the comparison site.

When the hospitalization rates for ARI and CDD are disaggregated, the hospitalization rate for ARI increased by 14 percent (from 9.2 to 10.5 per 100 children) in Maikuduk after IMCI was introduced, but increased by 25 percent (from 6.0 to 7.5 per 100 children) in Prishakhtinsk, where the IMCI strategy was not implemented. The difference is even greater for hospitalization for diarrheal disease. Whereas hospitalization for CDD increased by 38 percent between the pre-IMCI period and the post-IMCI period in Prishakhtinsk (from 2.9 to 4.0 per 100 children), hospitalization for CDD increased by only six percent in Maikuduk (from 3.3 to 3.5 per 100 children).
Quarterly data, displayed in Figure 6, show that ARI hospitalization rates followed similar trends in both sites, with the exception of a three-quarter peak in hospitalizations in the comparison site Prishakhtinsk between the second and fourth quarter of 2001. It is possible that the IMCI intervention stemmed such a peak in Maikuduk, but this cannot be concluded from the available data.

Trends in hospitalization for diarrheal disease suggest more convincingly that the introduction of IMCI may have played a role in slowing the growth in hospitalization rates in Maikuduk. Figure 7 shows that although the rates continued to move together in both sites before and after the intervention, hospitalization in Maikuduk was consistently lower than in Prishakhtinsk after IMCI was implemented in the third quarter of 2001.
C. Adjusted Relative Rates of Hospitalization for Children Under 5

The relative rate of hospitalization for children under five is a measure that describes the percentage by which hospitalization in the intervention site exceeds (relative rate >1) or is below (relative rate <1) hospitalization in the comparison site. If the relative rate is equal to one, there is no difference in hospitalization rates between the two sites. The relative rates of hospitalization for children under five are displayed in Figure 8. The relative rate for all cases was 1.22\(^1\) for the period before IMCI was introduced, which can be interpreted as children were 22 percent more likely to be hospitalized for all causes in the intervention site than in the comparison site before the implementation of IMCI. Following IMCI, the relative rate fell to 1.03\(^2\) or children were now only three percent more likely to be hospitalized for all causes in the intervention site than in the comparison site after the implementation of IMCI. The 95-percent confidence interval for the post-IMCI relative rate contains one, however, so there is no statistical difference in the hospitalization rate of children under five between the intervention and comparison.

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\(^1\) 95% confidence interval: [1.15, 1.30]

\(^2\) 95% confidence interval: [0.98, 1.08]
In order to control for factors other than those related to the IMCI intervention that may have affected hospitalization rates, the relative rate of hospitalization for children under five is adjusted by the relative rate of hospitalization for all other population groups. This adjustment controls for such factors as differences in socioeconomic status, distance to the hospital, and outbreaks of infectious illnesses, all of which may be systematically related to differences in the likelihood of hospitalization between the two sites over time. After adjusting for the hospitalization rate in the general population, the relative rate of hospitalization for children under five fell from 1.04 before the introduction of IMCI to 0.085 in the period after IMCI was initiated. Thus, controlling for external factors related to hospitalization, children in the intervention site were five percent more likely than those in the comparison site to be hospitalized before IMCI was introduced and fifteen percent less likely to be hospitalized after IMCI was introduced.

The relative rate of hospitalization for combined ARI/CDD also declined in the two sites between the pre-IMCI and post-IMCI periods, from 1.40 to 1.22. After adjusting hospitalization rates for general rates of hospitalization in the population, the relative rate for ARI/CDD declined from 1.20 to 1.02. As shown in Figure 9, the relative rate of hospitalization for ARI alone fell from 1.54 to 1.40, and the adjusted relative rate fell somewhat more from 1.32 to 1.17. The confidence intervals in the pre- and post-IMCI periods overlap, however, so the declines in the relative rates are not statistically significant.

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3 95% confidence interval: [1.24, 1.59]
4 95% confidence interval: [1.09 to 1.37]
5 95% confidence interval: [1.33, 1.79]
6 95% confidence interval: [1.21, 1.61]
Figure 10 shows that the relative rate of hospitalization for CDD fell from 1.12\(^7\) to 0.88\(^8\) and the adjusted relative rate fell from 0.96 to 0.73. The 95-percent confidence intervals before and after the intervention both contain one, however, so there is no statistical evidence of a difference in hospitalization patterns for CDD between the comparison and intervention sites, but this may also be related to the relatively low number of cases.

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\(^7\) 95% confidence interval [0.89, 1.41]  
\(^8\) 95% confidence interval [0.71, 1.09]
D. Costs of Avoidable Hospitalization

An analysis of the cost of hospital cases for ARI and CDD was completed for the three hospitals that treat the majority of childhood hospital cases in Karaganda City: the Infectious Disease Hospital, the Maikuduk Children’s Hospital, and the Oblast Children’s Hospital. Table 4 shows the reimbursement rates and the actual costs to hospitals, computed by a step-down cost accounting method, to treat pediatric ARI and CDD cases. The reimbursement rate for pediatric ARI cases is $42.11 per case in the Oblast Children’s Hospital and $52.09 per case in the Maikuduk Children’s Hospital. The Infectious Disease Hospital is not reimbursed on a per-case basis, but instead receives a guaranteed fixed budget each year. The actual cost of treating pediatric ARI cases ranges from $29.42 per case in the Maikuduk Children’s Hospital to $34.75 per case in the Infectious Disease Hospital.

Table 4. Costs and Reimbursement Rates for Pediatric ARI and CDD Hospital Cases in 2001 (US$) 1

<table>
<thead>
<tr>
<th>Cost Information</th>
<th>Infectious Disease Hospital</th>
<th>Maikuduk Children’s Hospital</th>
<th>Oblast Children’s Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARI Cases</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reimbursement Rate</td>
<td>N/A (fixed budget)</td>
<td>52.09</td>
<td>42.11</td>
</tr>
<tr>
<td>Actual Cost</td>
<td>34.75</td>
<td>29.42</td>
<td>31.18</td>
</tr>
<tr>
<td>Ratio of Cost/Reimbursement</td>
<td>N/A</td>
<td>0.56</td>
<td>0.74</td>
</tr>
<tr>
<td><strong>CDD Cases</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reimbursement Rate</td>
<td>N/A</td>
<td>50.30</td>
<td>24.48</td>
</tr>
<tr>
<td>Actual Cost</td>
<td>45.28</td>
<td>31.50</td>
<td>4.23</td>
</tr>
<tr>
<td>Ratio of Cost/Reimbursement</td>
<td>N/A</td>
<td>0.63</td>
<td>0.17</td>
</tr>
</tbody>
</table>

1 Exchange rate: $1 = 140 tenge

The reimbursement rate for pediatric CDD cases is $24.48 per case in the Oblast Children’s Hospital and $50.30 per case in the Maikuduk Children’s Hospital. The actual cost of treating pediatric ARI cases ranges from $4.23 per case in the Oblast Children’s Hospital to $45.28 per case in the Infectious Disease Hospital. The cost per case is so low in the Oblast Children’s Hospital, because typically children admitted to that hospital with a diarrhea diagnosis are moved to the Infectious Disease Hospital within one day of being admitted.

Therefore, if all 637 ARI hospital cases were avoided in Maikuduk in 2001, there would have been a savings to the health care system of between $18,740, if all cases were reimbursed at the lowest actual cost ($29.42 per case), and $33,178 if all cases were reimbursed at the highest rate ($52.09 per case). If all 282 CDD hospital cases were avoided in 2001, there would have been a savings to the health care system of between $6,903 and $14,186. The total potential savings to the health care system of avoiding all hospitalizations of children in Maikuduk for ARI and CDD, without taking into consideration the potential additional cost of managing all cases in the primary care setting, was between $25,643 and $47,364.

VI. Discussion

The results of the study were presented to an expert panel of fifteen health policymakers and physicians in Karaganda City for validation and interpretation. The panel included representatives from the Oblast and City Health Departments, the regional IMCI coordinator, and physicians from the hospitals and primary care centers included in the study. The panel determined that from the results of the study, two main conclusions can be drawn. First, the experts concluded that the slower growth of hospitalization in the intervention site than in the comparison site can be attributed at least partially to the introduction of the IMCI strategy. The physicians from the children’s hospital reported anecdotally that childhood illnesses are being managed better at the primary care level, and fewer hospital referrals are being made by...
primary care physicians. The panel felt that the IMCI intervention has been effective in changing clinical practices at the level of primary health care, and its expanded implementation was recommended.

Nonetheless, the rate of hospitalization increased in both sites during the study period. Thus, the second conclusion of the expert panel was that the implementation of IMCI can only have a limited impact on pediatric hospitalization without more fundamental changes in the organization of service delivery, the incentives in the health care system, household economic constraints, and the knowledge, attitudes and behavior of the community related to the management of childhood illnesses. This conclusion can be generalized to all activities that aim to improve the effectiveness and efficiency of the delivery system by strengthening the primary health care sector.

A. Organization of Service Delivery

The implementation of IMCI in Karaganda was accompanied by changes in clinical protocols and some changes in the organization of service delivery. For example, all family physicians regardless of their different specialty backgrounds (obstetrician-gynecologist, therapist, or pediatrician) were trained to use the IMCI treatment guidelines. Prior to the implementation of IMCI, these family physicians practiced only in their own specialty areas. Thus IMCI training was helpful in supporting the goals of health care reform to decrease reliance on specialists and to create a new cadre of general doctors. In addition, a new position was created in each of the IMCI districts to ensure quality of pediatric services, which may have led to fewer hospital referrals on the part of primary care providers.

The largest effect of IMCI on the hospitalization of children under five is observed for hospitalization related to diarrheal disease. Hospital admissions for diarrhea tend to be driven by infection control policies of the Sanitary-Epidemiology Service (SES), such as the regulation mandating a minimum of three laboratory cultures for any case of childhood diarrhea treated in the outpatient setting. This regulation encourages primary care physicians to refer children to the hospital to avoid the responsibility for the laboratory tests and reduce the number of contacts per case.

Referrals to hospitals by primary care providers for ARI and CDD in the intervention site decreased from 2.32 per 100 children for the one-year period before IMCI was introduced to 1.30 per 100 children, while referrals increased over the same period from 1.24 to 1.84 per 100 children in the comparison site. Furthermore, referrals from PHC providers accounted for 23.8 percent of hospitalizations for ARI and CDD in Maikuduk prior to the introduction of IMCI, while only 12.3 percent of hospital cases in Maikuduk were the result of a referral from a PHC provider following the introduction of IMCI. The percentage of ARI and CDD hospital cases that were referred by a PHC provider increased in Prishakhinsk from 13.9 to 16.0 percent.

An additional barrier to reducing hospitalization related to the organization of service delivery raised by the expert panel is the role of ambulance and emergency care. Ambulances have tended to serve as a general source of transportation in the health care system, rather than being limited to emergency situations. The ambulance personnel are often reluctant to make the judgment that an ill child does not need to be hospitalized, and thus they are responsible for the majority of the hospital referrals (62 percent in the intervention site both before and after the introduction of IMCI). The expert panel recommended training ambulance personnel in IMCI to improve their clinical judgment and skills in the management of childhood illnesses, so they are better able to recognize when hospitalization is truly necessary.

B. Economic Incentives

The main reason given by the expert panel for the observed increase in hospitalization in both sites over the study period was an increase in the overall health sector budget in Karaganda. The increase in the health sector budget made more medications and other inputs available in the hospitals. With more medications available, which are supposed to be provided for free in the hospital setting, hospitalization
became a more attractive option for parents to care for sick children, particularly among poorer households. Outpatient care often imposes a significant economic burden on poor households, because working mothers have difficulty taking time from their jobs to stay at home with a sick child, and medicines prescribed in the outpatient setting must be paid for out-of-pocket. Reducing some of the economic barriers to hospital care with an increase in the budget, particularly for inpatient medicines, during the study period made hospitalization more accessible relative to outpatient care.

The role of economic incentives created by provider payment systems in stimulating increases in hospitalization was also discussed with the expert panel. Primary care providers are paid on a per capita basis, or a fixed amount per person per month to provide all necessary care to their enrolled population. The per capita rate is paid to the primary care providers each month regardless of how many visits each enrolled person makes to the facility. Therefore, there is no inherent incentive in the primary care payment system to reduce hospital referrals, and in fact the incentive is to refer sick patients onward for specialty care. In addition to the financial incentive to refer, the primary care providers are held strictly accountable for all infant and child deaths in their enrolled population, so primary care providers also have the incentive to refer sick children to the hospital to reduce their risk of punishment.

The provider payment system for hospital care in Karaganda may also encourage, or at least not discourage, hospitalizations. Until recently, hospitals were paid a fixed price per case based on the resource-intensity of the diagnosis, which is similar to the Diagnosis-Related Group hospital payment method in the U.S. Medicare system. Case-based hospital payment systems are often accompanied by an increase in the number of admissions. Since 1999, however, the hospital payment system in Karaganda, and in Kazakhstan nationally, has been based on fixed price-volume contracts through the government contracting mechanism GosZakaz. Each hospital’s annual budget under the GosZakaz contract is based on the expected number of hospital cases, the case-mix across diagnosis-related groups, and the fixed price per case for each diagnosis-related group. Thus, there is no longer an obvious incentive for hospitals to increase the number of hospital admissions. In fact, the Chief Physician from the Maikuduk Children’s hospital claimed that his projected number of admissions for 2002 had already been reached as of October, and he would not be compensated further for any additional admissions during this year. The budget for the following year, however, is based at least partially on the previous year’s admissions, so the hospital will be rewarded in the following year for increasing admissions beyond the projected number this year. Furthermore, the cost analysis showed that at least one hospital has been able to treat cases of ARI and CDD at a lower cost than the rate at which the hospital is reimbursed. Thus, there is some incentive to increase admissions for these cases more than for other cases that are not as profitable for the hospital.

C. Household Knowledge, Attitudes, and Behavior

Many of the hospitalizations of children during the study period were self-referrals, indicating that perceptions about the treatment of childhood illnesses may not have changed significantly as a result of the IMCI intervention. Although the implementation of the IMCI strategy includes a community education component, these activities are typically emphasized less than other aspects of the IMCI strategy, and these activities may not have the power to fundamentally change household behavior related to childhood illnesses. In addition, changes in knowledge and attitudes may not be sufficient to overcome the enormous economic constraints that households face, which often drive their decisions regarding health care utilization. As discussed above, under certain conditions the economic burden to households of outpatient treatment may be larger than for inpatient treatment, particularly when a working parent is not compensated for sick leave to stay at home with an ill child.


VIII. Conclusions

The results of this study were seen as positive evidence of the successful introduction of IMCI, particularly in view of early predictions made by Karaganda health policymakers and representatives from WHO that the intervention may take at least two years to show significant effects on hospitalization in the urban areas of Kazakhstan. Furthermore, the implementation of IMCI was intended to be supported by free distribution of medicines for ARI and CDD at the primary care facilities provided by UNICEF, but those medicines did not become available during the study period. Therefore, the IMCI strategy showed an effect on hospitalization, even in the absence of one of the most crucial components of the planned implementation. Since the study was completed, IMCI drugs have been supplied to Karaganda Oblast by UNICEF, and the Oblast Health Department is exploring options to ensure sustainable access to IMCI outpatient drugs for children.

Obstacles to achieving reductions in avoidable hospitalization from the implementation of IMCI, however, remain in Karaganda. For example, implementing the IMCI clinical guidelines may have only a limited impact on referrals and hospitalization, because administrative referral guidelines that contradict IMCI treatment guidelines change very slowly in practice, there are not yet sufficient economic incentives to reduce hospital referrals, and household attitudes and behavior toward treating childhood illnesses are strongly influenced by their socioeconomic situation. Additional legislative changes may be needed, particularly to address contradictory guidelines from SES.

The conclusions of the study support the WHO position that IMCI should be implemented as a three-component strategy addressing case-management skills, health system improvements, and family and community practice improvements. Inadequate emphasis on any one of the components will reduce the overall impact of the IMCI strategy. Furthermore, based on the results of this study, it is clear that strengthening primary health care through the implementation of the IMCI strategy is a necessary, but not a sufficient condition for reducing avoidable hospitalization of children under five. The comprehensive health system development process must continue in Karaganda, to continue to change the economic incentives that favor hospital care over primary care and to reduce the administrative constraints to managing more illnesses at the primary health care level. Furthermore, in addition to health knowledge and attitudes, the social and economic realities faced by households, and how those realities affect health care utilization decisions must be considered when new primary health care strategies are developed and introduced.
References


### Appendix 1: List of ICD-10 Codes and Diagnoses for ARI and CDD

<table>
<thead>
<tr>
<th>ICD 10</th>
<th>CDD</th>
<th>ACUTE UPPER RESPIRATORY INFECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A00</td>
<td>Cholera</td>
<td>J00 Acute nasopharyngitis (common cold)</td>
</tr>
<tr>
<td>A00.0</td>
<td>Cholera due to vibrio cholerae 01, biovar cholerae</td>
<td>J01 Acute sinusitis</td>
</tr>
<tr>
<td>A00.1</td>
<td>Cholera due to vibrio cholerae 01, biovar eltor</td>
<td>J01.0 Acute maxillary sinusitis</td>
</tr>
<tr>
<td>A00.9</td>
<td>Cholera, unspecified</td>
<td>J01.1 Acute frontal sinusitis</td>
</tr>
<tr>
<td>A01</td>
<td>Typhoid and paratyphoid fevers</td>
<td>J01.2 Acute ethmoidal sinusitis</td>
</tr>
<tr>
<td>A01.0</td>
<td>Typhoid fever</td>
<td>J01.3 Acute sphenoidal sinusitis</td>
</tr>
<tr>
<td>A01.1</td>
<td>Paratyphoid fever A</td>
<td>J01.4 Acute parasinusitis</td>
</tr>
<tr>
<td>A01.2</td>
<td>Paratyphoid fever B</td>
<td>J01.8 Other acute sinusitis</td>
</tr>
<tr>
<td>A01.3</td>
<td>Paratyphoid fever C</td>
<td>J01.9 Acute sinusitis, unspecified</td>
</tr>
<tr>
<td>A01.4</td>
<td>Paratyphoid fever, unspecified</td>
<td>J02 Acute pharyngitis</td>
</tr>
<tr>
<td>A02</td>
<td>Other salmonella infections</td>
<td>J02.0 Streptococcal pharyngitis</td>
</tr>
<tr>
<td>A02.0</td>
<td>Salmonella enteritis</td>
<td>J02.8 Acute pharyngitis due to other specified organisms</td>
</tr>
<tr>
<td>A02.1</td>
<td>Salmonella septicaemia</td>
<td>J02.9 Acute pharyngitis, unspecified</td>
</tr>
<tr>
<td>A02.2</td>
<td>Localized salmonella infections</td>
<td>J03 Acute tonsillitis</td>
</tr>
<tr>
<td>A02.8</td>
<td>Other specified salmonella infections</td>
<td>J03.0 Streptococcal tonsillitis</td>
</tr>
<tr>
<td>A02.9</td>
<td>Salmonella infection, unspecified</td>
<td>J03.8 Acute tonsillitis due to other organisms</td>
</tr>
<tr>
<td>A03</td>
<td>Shigellosis</td>
<td>J03.9 Acute tonsillitis, unspecified</td>
</tr>
<tr>
<td>A03.0</td>
<td>Shigellosis due to shigella dysenteriae</td>
<td>J04 Acute laryngitis and tracheitis</td>
</tr>
<tr>
<td>A03.1</td>
<td>Shigellosis due to shigella flexneri</td>
<td>J04.0 Acute laryngitis</td>
</tr>
<tr>
<td>A03.2</td>
<td>Shigellosis due to shigella boydii</td>
<td>J04.1 Acute tracheitis</td>
</tr>
<tr>
<td>A03.3</td>
<td>Shigellosis due to shigella sonnei</td>
<td>J04.2 Acute laryngotracheitis</td>
</tr>
<tr>
<td>A03.8</td>
<td>Other shigellosis</td>
<td>J05 Acute obstructive laryngitis (croup) and epiglottitis</td>
</tr>
<tr>
<td>A03.9</td>
<td>Shigellosis, unspecified</td>
<td>J05.0 Acute obstructive laryngitis (croup)</td>
</tr>
<tr>
<td>A04</td>
<td>Other bacterial intestinal infections</td>
<td>J05.1 Acute epiglottitis</td>
</tr>
<tr>
<td>A04.0</td>
<td>Enteropathogenic escherichia coli infection</td>
<td>J06 Acute upper respiratory infections of multiple and unspecified sites</td>
</tr>
<tr>
<td>A04.1</td>
<td>Enterotoxigenic escherichia coli infection</td>
<td>J06.0 Acute laryngopharyngitis</td>
</tr>
<tr>
<td>A04.2</td>
<td>Enteroinvasive escherichia coli infection</td>
<td>J06.8 Other acute upper respiratory infections of multiple sites</td>
</tr>
<tr>
<td>A04.3</td>
<td>Enterohaemorrhagic escherichia coli infection</td>
<td>J06.9 Acute upper respiratory infection, unspecified</td>
</tr>
<tr>
<td>A04.4</td>
<td>Other intestinal escherichia coli infection</td>
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</tr>
<tr>
<td>A04.5</td>
<td>Campylobacter enteritis</td>
<td></td>
</tr>
<tr>
<td>A04.6</td>
<td>Enteritis due to yersinia enterocolitica</td>
<td></td>
</tr>
<tr>
<td>A04.7</td>
<td>Enterocolitis due to clostridium difficile</td>
<td></td>
</tr>
<tr>
<td>A04.8</td>
<td>Other specified bacterial intestinal infections</td>
<td></td>
</tr>
<tr>
<td>A04.9</td>
<td>Bacterial intestinal infections, unspecified</td>
<td></td>
</tr>
<tr>
<td>A05</td>
<td>Other bacterial food borne infections</td>
<td></td>
</tr>
<tr>
<td>A05.0</td>
<td>Foodborne staphylococcal intoxication</td>
<td></td>
</tr>
</tbody>
</table>

### ACUTE LOWER RESPIRATORY INFECTIONS

<table>
<thead>
<tr>
<th>ICD 10</th>
<th>ARI</th>
</tr>
</thead>
<tbody>
<tr>
<td>J20</td>
<td>Acute bronchitis</td>
</tr>
<tr>
<td>J20.0</td>
<td>Acute bronchitis due to mycoplasma pneumoniae</td>
</tr>
<tr>
<td>J20.1</td>
<td>Acute bronchitis due to haemophilus influenzae</td>
</tr>
<tr>
<td>J20.2</td>
<td>Acute bronchitis due to streptococcus</td>
</tr>
<tr>
<td>J20.3</td>
<td>Acute bronchitis due to coxsackievirus</td>
</tr>
<tr>
<td>J20.4</td>
<td>Acute bronchitis due to parainfluenza virus</td>
</tr>
<tr>
<td>J20.5</td>
<td>Acute bronchitis due to respiratory syncytial virus</td>
</tr>
</tbody>
</table>
A05.1 Botulism
A05.2 Foodborne clostridium perfringens intoxication
A05.3 Foodborne vibrio parahaemolyticus intoxication
A05.4 Foodborne bacillus cereus intoxication
A05.8 Other specified bacterial foodborne infections
A05.9 Bacterial foodborne infections, unspecified
A06 Amoebiasis
A06.0 Acute amoebic dysentery
A06.1 Chronic intestinal amoebiasis
A06.2 Amoebic nondysenteric colitis
A06.3 Amoeboma of intestine
A06.4 Amoebic liver abscess
A06.5 Amoebic lung abscess
A06.6 Amoebic brain abscess
A06.7 Cutaneous amoebiasis
A06.8 Amoebic infection of other sites
A06.9 Amoebiasis, unspecified
A07 Other protozoal intestinal infections
A07.0 Balantidiasis
A07.1 Giardiasis (lambliasis)
A07.2 Cryptosporidiosis
A07.3 Isosporiasis
A07.8 Other specified protozoal intestinal infections
A07.9 Protozoal intestinal disease, unspecified
A08 Viral and other specified intestinal infections
A08.0 Rotaviral enteritis
A08.1 Acute gastroenteropathy due to norwalk agent
A08.2 Adenoviral enteritis
A08.3 Other viral enteritis
A08.4 Viral intestinal infection, unspecified
A08.5 Other specified intestinal infections
A09 Diarrhoea and gastroenteritis of presumed infectious origin
B81 Other intestinal helminthiases, not elsewhere classified
B81.0 Anisakiasis
B81.1 Intestinal capillarisis
B81.2 Trichostrongyliasis
J20.6 Acute bronchitis due to rhinovirus
J20.7 Acute bronchitis due to echovirus
J20.8 Acute bronchitis due to other specified organisms
J20.9 Acute bronchitis, unspecified
J21 Acute bronchiolitis
J21.0 Acute bronchiolitis due to respiratory syncytial virus
J21.8 Acute bronchiolitis due to other specified organisms
J21.9 Acute bronchiolitis, unspecified
J22 Unspecified acute lower respiratory infection
J10 Influenza due to identified influenza virus
J10.0 Influenza with pneumonia, influenza virus identified
J10.1 Influenza with other respiratory manifestations, influenza virus identified
J10.8 Influenza with other manifestations, influenza virus identified
J11 Influenza, virus not identified
J11.0 Influenza with pneumonia, virus not identified
J11.1 Influenza with other respiratory manifestations, virus not identified
J11.8 Influenza with other manifestations, influenza virus not identified
J12 Viral pneumonia, not elsewhere classified
J12.0 Adenoviral pneumonia
J12.1 Respiratory syncytial virus pneumonia
J12.2 Parainfluenza virus pneumonia
J12.8 Other viral pneumonia
J12.9 Viral pneumonia, unspecified
J13 Pneumonia due to streptococcus pneumoniae
J14 Pneumonia due to haemophilus influenzae
J15 Bacterial pneumonia, not elsewhere classified
J15.0 Pneumonia due to klebsiella pneumoniae
J15.1 Pneumonia due to pseudomonas
J15.2 Pneumonia due to staphylococcus
J15.3 Pneumonia due to streptococcus, group b
J15.4 Pneumonia due to other streptococci
J15.5 Pneumonia due to escherichia coli
J15.6 Pneumonia due to other aerobic gram-negative bacteria
J15.7 Pneumonia due to mycoplasma pneumonia
J15.8 Other bacterial pneumonia
J15.9 Bacterial pneumonia, unspecified
<table>
<thead>
<tr>
<th>Code</th>
<th>Condition</th>
<th>Code</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B81.3</td>
<td>Intestinal angiostrongyliaisis</td>
<td>J16</td>
<td>Pneumonia due to other infectious organisms, not elsewhere classified</td>
</tr>
<tr>
<td>B81.4</td>
<td>Mixed intestinal helminthias</td>
<td>J16.0</td>
<td>Chlamydial pneumonia</td>
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<td>J16.8</td>
<td>Pneumonia due to other specified infectious organisms</td>
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<tr>
<td>B82.0</td>
<td>Intestinal helminthias, unspecified</td>
<td>J17</td>
<td><strong>Pneumonia in diseases classified elsewhere</strong></td>
</tr>
<tr>
<td>B82.9</td>
<td>Intestinal parasitism, unspecified</td>
<td>J17.0</td>
<td>Pneumonia in bacterial diseases classified elsewhere</td>
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<td>Functional diarrhoea</td>
<td>J17.1</td>
<td>Pneumonia in viral diseases classified elsewhere</td>
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<td>K59.9</td>
<td>Functional intestinal disorder unspecified</td>
<td>J17.2</td>
<td>Pneumonia in mycoses</td>
</tr>
</tbody>
</table>
Appendix 2: Summary of the IMCI Strategy

A. Clinical Guidelines and Improving Clinical Skills

The IMCI clinical guidelines describe the stepwise assessment, classification, treatment, counseling, and referral of sick children (Boulanger et al. 1999). The guidelines are based on the detection of simple clinical signs without resorting to laboratory tests, followed by empirical treatment (Rowe et al. 1999). Using the guidelines, health care workers assess sick children in a systematic way then classify them as requiring urgent referral and immediate pre-referral treatment, specific medical treatment and advice, or simple advice and home management (Rowe et al. 1999).

The IMCI clinical guidelines for specific childhood illnesses are not entirely new. For example, the recommendations for case management of diarrheal disease and ARI are very close to those that have been promoted by WHO for more than ten years (Lambrechts et al. 1999). The integrated approach in service delivery and community interventions, however, requires new levels of coordination and shared responsibility. The guidelines are generic and must be adapted for use in individual countries based on national policies, the epidemiological situation, and cultural norms. The guidelines may need to be adapted to reflect national policies, existing guidelines, or disease conditions that are major causes of morbidity and mortality in the country. The guidelines may also be adapted to reflect local infant and child feeding practices and locally available foods.

The clinical training that accompanies the IMCI clinical guidelines is a standard 11-day course with 30 percent of instructional time spent in supervised clinical practice (Lambrechts et al. 1999). Early assessments of IMCI training activities have led to the recommendations that a pool of experienced course facilitators be developed and sustained, that training be planned so that all targeted health workers from the same facility are trained within a brief time period, and that all trainees receive a follow-up visit within four to six weeks of completion of the course. At least 60 percent of health workers in a facility should be trained in IMCI for coverage to be considered adequate (Lambrechts et al. 1999).

B. Strengthening the Health System to Support IMCI

The IMCI strategy focuses on creating the essential conditions in the health care system to ensure the effectiveness of child health interventions (Lambrechts et al. 1999). For example, issues related to drug availability must be addressed, as well as the organization of health care workers and the referral pathways in the system. Although IMCI requires only a limited set of drugs (from 16 to 20 in selected adaptations), most countries implementing the strategy have had difficulty ensuring drug availability, particularly for second-line treatments and pre-referral drugs (Lambrechts et al. 1999).

The appropriate organization of primary health care services is also important to the IMCI strategy. For example, in larger urban facilities, IMCI tasks may be performed by several different health workers, which may inhibit IMCI’s integrated approach (Lambrechts et al. 1999). Implementation of the IMCI strategy highlights these organizational issues and may facilitate the streamlining of primary care service delivery.

The linkage between disease reporting and surveillance in a country and IMCI implementation may represent challenge to health workers. The disease classifications in the health information system (HIS) may not be consistent with IMCI classifications, which may reduce the performance of individual health care workers performing the dual activities of case management and disease surveillance (Rowe et al. 1999). Modification of the HIS classifications or translation of IMCI classifications into the HIS classifications may need to be considered during adaptation of IMCI guidelines.
C. Improving Family and Community Health Practices

The IMCI strategy aims to not only improve the management of childhood illnesses by health workers, but also to improve family and community health practices by building on existing community-based actions to improve child health and nutrition. In addition, the IMCI guidelines for first-level care are designed to improve communication with mothers. Counseling skills are taught during the IMCI training course, and terminology is modified during adaptation of the IMCI guidelines to be understandable and culturally appropriate.