

Management of severely ill children at first-level health facilities in sub-Saharan Africa when referral is difficult

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Objectives To quantify the main reasons for referral of infants and children from first-level health facilities to referral hospitals in sub-Saharan Africa and to determine what further supplies, equipment, and legal empowerment might be needed to manage such children when referral is difficult.

Methods In an observational study at first-level health facilities in Uganda, the United Republic of Tanzania, and Niger, over 3–5 months, we prospectively documented the diagnoses and severity of diseases in children using the standardized Integrated Management of Childhood Illness (IMCI) guidelines. We reviewed the facilities for supplies and equipment and examined the legal constraints of health personnel working at these facilities.

Findings We studied 7195 children aged 2–59 months, of whom 691 (9.6%) were classified under a severe IMCI classification that required urgent referral to a hospital. Overall, 226 children had general danger signs, 292 had severe pneumonia or very severe disease, 104 were severely dehydrated, 31 had severe persistent diarrhoea, 207 were severely malnourished, and 98 had severe anaemia. Considerably more ill were 415 young infants aged one week to two months: nearly three-quarters of these required referral. Legal constraints and a lack of simple equipment (suction pumps, nebulizers, and oxygen concentrators) and supplies (nasogastric tubes and 50% glucose) could prevent health workers from dealing more appropriately with sick children when referral was not possible.

Conclusion When referral is difficult or impossible, some additional supplies and equipment, as well as provision of simple guidelines, may improve management of seriously ill infants and children.

Keywords Child health services; Primary health care; Referral and consultation; Health personnel; Delivery of health care, Integrated; Equipment and supplies, Hospital; Health services accessibility; Patient care management/legislation; Infant; Child, Preschool; Prospective studies; Africa South of the Sahara; Uganda; United Republic of Tanzania; Niger (*source: MeSH, NLM*).

Mots clés Service santé infantile; Programme soins courants; Consultation pour avis expert; Personnel sanitaire; Distribution intégrée soins; Equipement et appareillage hospitaliers; Accessibilité service santé; Gestion soins aux patients/législation; Nourrisson; Enfant âge pré-scolaire; Etude prospective; Afrique subsaharienne; Ouganda; République-Unie de Tanzanie; Niger (*source: MeSH, INSERM*).

Palabras clave Servicios de salud infantil; Atención primaria de salud; Remisión y consulta; Personal de salud; Entrega integrada de atención de salud; Equipo y suministro de hospitales; Accesibilidad a los servicios de salud; Manejo de atención al paciente/legislación; Lactante; Infante; Estudios prospectivos; África del Sur del Sahara; Uganda; República Unida de Tanzania; Níger (*fuelle: DeCS, BIREME*).

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يمكن الاطلاع على الملخص بالعربية على الصفحة ٥٣٠.

Introduction

In developing countries, most of the 11 million deaths per year of children aged under five years occur in areas in which adequate medical care is not available (1). First-level health facilities — the closest health care services available to most

sick children in developing countries — generally are run by medical staff who are not physicians. These clinics do not have beds for admitting patients, and essential drugs and supplies often are not available (2). Recently, WHO and UNICEF developed the Integrated Management of Childhood Illness (IMCI) as a strategy to improve childhood survival (3). This

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strategy rationalized the management of patients at first-level facilities to try to reduce childhood mortality. The IMCI strategy uses simple signs and symptoms to assess and classify illness, thus allowing health workers at first-level facilities to identify which children have minor illnesses that need symptomatic treatment (e.g. oral rehydration therapy), which need specific therapy that can be given at the first-level facility (e.g. antimicrobial or antimalarial therapies), and which need referral to a hospital. The IMCI categorizes three types of referral (Box 1).

Field studies of IMCI guidelines have shown that 10–34% of assessed children need to be referred (4–7), but no data on the frequency of children who require referral are available during routine implementation of IMCI. The IMCI guidelines for first-level care of children assume that referral is an option for staff at first-level centres; however, in many settings, referral is difficult or impossible (4) for several reasons: distance, geographical difficulty of access, climatic conditions, cost, cultural perceptions, or perceived poor quality of service at the referral institution. When referral is impossible and the only option is to manage the patient at the first-level facility, health workers at these facilities may have to make critical decisions about whether to pursue referral or to manage the child locally. Currently, no guidelines address the management of infants and children with severe illness at a first-level facility when referral is impossible. Information on the frequency of these severe classifications is needed so that such guidelines can be developed. Knowledge about what supplies and equipment are available at these remote sites is also crucial in order to determine which additional supplies would be needed to manage a severely ill child at a first-level facility. Finally, for these guidelines to be implemented, it is important to know what procedures the health workers are allowed to perform and what regulatory obstacles are present. The current study aimed to obtain this information from selected areas of three countries where referral is difficult or impossible.

Methods

Selection of countries, districts, and health centres

The study was performed in Uganda, the United Republic of Tanzania, and Niger. These three African countries have introduced IMCI and also have areas in which referral is considered difficult or impossible because of geomorphological factors or distance. All the major childhood diseases covered by IMCI are present in these three countries (acute respiratory infections, diarrhoeal diseases, malaria, measles, malnutrition, and neonatal problems). Acute respiratory infections and diarrhoeal diseases are very common all year round, with some seasonality; malaria and malnutrition are more seasonal.

National clearance from the governments was obtained to conduct this study. In each country, we selected districts that had terrain and weather conditions that contributed to difficulty in the referral process. The principal investigator in each country, in conjunction with officials from the ministry of health, collected data from selected first-level health facilities in the study districts. Members of the district health team, as well as health workers at first-level health facilities, were interviewed to determine from which facilities referral was difficult or impossible. In Uganda, 39 health centres in four districts (Mukono and Nakasongola from central, Kabale from

Box 1. Integrated Management of Childhood Illness (IMCI) categories of referral

Urgent referral

Any child who exhibits one of the general danger signs under IMCI including:

- convulsions
- inability to drink
- vomiting everything
- unconsciousness or lethargy
- specific combinations of signs and symptoms that identify severe illness (3).

Non-urgent referral

The child coughs for more than 30 days or has a fever for more than 7 days.

Other referrals

Referral of "other problems" not identified by the IMCI classification, but still in need of specialized management — for example, trauma, osteomyelitis of long duration, etc. (1, 3).

western, and Moroto from eastern regions of the country) were reviewed; in the United Republic of Tanzania, seven facilities in the Mpwapwa district were chosen, and in Niger, 16 health centres in the Boboye and Birninkonni districts were reviewed. The selected first-level health facilities were inspected for availability of supplies and equipment that might be needed to manage severely ill children at the health centre. Finally, we interviewed officials from the ministries of health and professional councils about health workers' legal constraints in managing children at first-level units.

Prospective documentation of consultations with sick children

Rural first-level health facilities in each country were chosen to document visits of sick children for when referral was deemed to be difficult or impossible. Patient access to the referral-level hospital in each of these predominantly rural districts in which IMCI was used regularly was not easy, and this minimized the number of patients who bypassed a first-level facility to go straight to hospital. At each chosen facility, only the dispensing nurses or clinical officers who previously had been trained in IMCI were recruited and briefed on the study objectives. Other non-IMCI trained staff worked at these facilities, but they were not recruited to the study. Provisions were made for the IMCI-trained staff to see all of the children during the study period. All children aged between seven days and five years who presented as outpatients to the health facility with any condition (except for well-child visits and vaccinations without any other problem) were studied over three to five months.

Training in IMCI involves training in the use of a single-page, country-adapted, patient recording form. These forms contain all the symptoms and signs used to assess children, as well as a record of the classifications and management of these patients. In routine practice, these forms are not available, but for the purposes of the study they were provided to health workers, who were trained in their use. The investigators made supervisory visits every four to six weeks, and health workers were given feedback on the completeness of recording on the forms. Health workers were given no further training.

Data analysis

Data were double entered using EpiInfo software (version 6.0). The frequency distributions of children aged two months

to five years and young infants aged one week to two months were examined. Supplies and equipment available at first-level health facilities and health worker functions at these facilities were also examined. The χ^2 test with Yates correction was used to test for the significance of differences in the referral rates between the countries.

Results

Children aged two months to five years

Reviews and interviews were conducted in 62 health centres. Health workers opined that referral was difficult or impossible at 19 of the health centres at which prospective documentation of illness was made. Over the course of the study, health workers in the three countries saw 7195 children.

General danger signs

Overall, 226 (3.1%) children had 260 general danger signs according to the IMCI classification (Table 1). A history of convulsions (or convulsions that occurred in the health centre) was the most common danger sign, followed by lethargy and unconsciousness. Of the 151 children with convulsions, 18 (12%) were lethargic or unconscious, but the rest had a normal sensorium. Twenty-eight children vomited everything; in 16 of these, this occurred in association with diarrhoea. Nine of the 28 children who vomited everything were unable to feed, four of whom were lethargic, and one had a stiff neck. Three children had a fever as the only other symptom besides vomiting everything.

Severe classifications

In total, 3203 (44.5%) children had a cough or had difficulty breathing. Of these, 292 (9.1%) were classified as having severe pneumonia and 170 (58%) of these also had a general danger sign, leaving 122 (42%) with severe pneumonia as their only classification. Diarrhoeal disease, which was seen in one-third of the patients, was very common. Only 104 (1.5%) of these children had severe dehydration, however. Severe febrile disease (fever with a general danger sign or a stiff neck) was the second most common severe classification after severe pneumonia; it occurred in almost 4% (273) of children. Overall, however, 6242 (86.8%) of the children studied had fever according to their history or examination. Ear problems were uncommon; mastoiditis was extremely rare (fewer than one in 1000 children). Almost 4% of the children were severely malnourished (207, 2.88%) or had severe anaemia (98, 1.36%): severe anaemia was about half as common as malnutrition. In total, 691 (9.6%) children had a severe classification that required urgent referral to hospital and another 71 (1.0%) had a non-urgent cause for referral. This corresponds to a mean referral rate of 10.6% among children aged two months to five years, with country rates of 6.3% in the United Republic of Tanzania, 7.3% in Uganda, and 26.7% in Niger ($P<0.0001$ for Niger vs the United Republic of Tanzania or Uganda).

The highest proportion of ill children were seen in Niger, where almost one in 11 had a general danger sign compared with only one in 70 in the United Republic of Tanzania ($P<0.0001$). Infants and children in Niger had significantly more general danger signs ($P<0.001$), such as a history of/or convulsions, an inability to drink or breastfeed, and lethargy or unconsciousness, than in Uganda or the United Republic of Tanzania. This was also true of severe pneumonia ($P<0.05$).

Diarrhoeal disease was much more common in Niger, where it was seen in 585 (59.6%) children ($P<0.0001$ compared with Uganda or the United Republic of Tanzania). Likewise, severe febrile disease, severe malnutrition, and severe anaemia all were very common in Niger and occurred significantly more often than in Uganda or the United Republic of Tanzania ($P<0.0001$).

Other problems and non-urgent causes for referral

Other problems occurred in almost 20% of children, but very few of these needed urgent referral to the hospital. Surprisingly, non-urgent reasons for referral to hospital were uncommon, with chronic cough occurring in 20 (0.28%) children and fever lasting longer than seven days in 51 (0.7%).

Sick young infants aged one week to two months

Considerably fewer young infants than older children were seen overall (415 vs 7195). Most infants (308/415, 74.2%) received a severe IMCI classification that required referral (Table 2), and most young infants (229, 55.2%) had a classification of "possible severe bacterial infection". The second most common problem was the inability to feed, which was seen in 68 (16.4%) infants.

Equipment and supplies available at first-level health facilities

Table 3 shows the results of a survey of the equipment available at 62 first-level health facilities in the three countries. Most facilities had a refrigerator to store vaccines, weighing scales, thermometers, syringes and needles, and intramuscular penicillin. Rectal and/or intravenous diazepam was available in three-quarters of the facilities, but microscopes with glass slides for detection of malarial parasites and intramuscular quinine for treatment of severe malaria were available only in about half of the facilities. One-third of the facilities possessed nasogastric tubes, sets for giving intravenous fluids, and injectable chloramphenicol. One-quarter owned lumbar puncture needles and suction pumps; however, large differences were seen between countries. Only one centre had a nebulizer, two possessed a blood-giving set, three had 50% glucose (dextrose), and only 5% had a source of oxygen, but without delivery devices such as nasal cannulas.

Legal constraints to management of severely ill children at first-level health facilities

Management of patients at first-level health facilities where referral is difficult or impossible depends on the permitted functions of the health workers. We explored restrictions on their prescribing and dispensing of drugs, as well as legal constraints to performing basic procedures that would be needed to treat a child who could not be referred (Table 4).

Clinical officers and nurses comprise the two levels of health workers at first-level facilities in Uganda and the United Republic of Tanzania. The facilities in Niger employ only nurses. All categories of health workers are allowed to administer intramuscular and intravenous injections, as well as intravenous fluids, but none were allowed to give intraosseous, intravenous fluids. Only nurses in Niger could perform lumbar punctures. In the United Republic of Tanzania and Niger, health workers were allowed to perform nasopharyngeal suction and give oxygen. Only clinical officers in Uganda were not permitted to pass a nasogastric tube to give

Table 1. Classification of children aged 2 months–5 years

Variable	No. of children ^a			
	Uganda	United Republic of Tanzania	Niger	Total
Total centres	14	3	2	19
Total children	3671	2540	984	7195 (100)
Total classifications	11 784	7020	3714	22 518
Total classification/children	3.2	2.8	3.8	3.1
Months of observation	3.5	4	5	
A. General danger signs				
History of/or convulsions	78 (2.1)	28 (1.1)	45 (4.6)	151 (2.1)
Vomiting everything	16 (0.4)	4 (0.2)	8 (0.8)	28 (0.4)
Not able to drink or breastfeed	9 (0.2)	11 (0.4)	15 (1.5)	35 (0.5)
Lethargic or unconscious	9 (0.2)	9 (0.4)	28 (2.8)	46 (0.6)
<i>Subtotal</i>	112 (3.1)	52 (2.0)	96 (9.8)	260 (3.6)
Number of children with general danger sign	105 (2.9)	35 (1.4)	86 (8.7)	226 (3.1)
B. Main symptoms				
Cough/difficult breathing	2114 (57.6)	649 (25.6)	440 (44.7)	3203 (44.5)
Severe pneumonia/severe disease	161 (4.4)	64 (2.5)	67 (6.8)	292 (4.1)
Severe pneumonia (no general danger signs)	66 (1.8)	26 (1.0)	30 (3.0)	122 (1.7)
Diarrhoea	1395 (38.0)	459 (18.1)	585 (59.6)	2439 (33.9)
Severe dehydration ^b	32 (0.9)	19 (0.7)	53 (5.4)	104 (1.5)
Severe persistent diarrhoea	4 (0.1)	5 (0.2)	22 (2.2)	31 (0.4)
Fever	3301 (89.9)	2021 (79.6)	920 (93.5)	6242 (86.8)
Severe febrile disease	141 (3.8)	46 (1.8)	86 (8.7)	273 (3.8)
Severe complicated measles	8 (0.2)	1 (0)	6 (0.6)	15 (0.2)
Ear problem	127 (3.5)	28 (1.1)	48 (4.9)	203 (2.8)
Mastoiditis	4 (0.1)	1 (0)	2 (0.2)	7 (0.1)
C. Malnutrition and anaemia				
Nutrition and anaemia	3166 (86.2)	2431 (95.7)	984 (100)	6 581 (91.5)
Severe malnutrition/severe anaemia	44 (1.2)	80 (3.1)	142 (14.4)	266 (3.7)
Severe malnutrition	30 (0.8)	70 (2.8)	107 (10.9)	207 (2.9)
Severe anaemia	18 (0.5)	17 (0.7)	63 (6.4)	98 (1.4)
D. Other problems				
Skin conditions (sores, rashes, scabies, tinea)	349 (9.5)	66 (2.6)	52 (5.3)	467 (6.5)
Wounds, cuts, scalds, burns, foreign bodies	79 (2.2)	5 (0.2)	5 (0.5)	89 (1.2)
Helminths	67 (1.8)	30 (1.2)	9 (0.9)	106 (1.5)
Swellings (adenitis, cellulitis)	62 (1.7)	0	0	62 (0.9)
Eye problems	45 (1.2)	340 (13.4)	34 (3.5)	419 (5.8)
Abscesses	41 (1.1)	11 (0.4)	1 (0.1)	53 (0.7)
Abdominal discomfort/pain	40 (1.1)	0	8 (0.8)	48 (0.7)
Stomatitis, oral thrush	38 (1.0)	5 (0.2)	25 (2.5)	68 (1.0)
Urinary tract infection	28 (0.8)	5 (0.2)	3 (0.3)	36 (0.5)
Itching vulva, penile and vaginal discharge	15 (0.4)	0	1 (0.1)	16 (0.2)
Asthma	4 (0.1)	0	2 (0.2)	6 (0.1)
Other	1 (0.0)	0	5 (0.5)	6 (0.1)
<i>Subtotal</i>	769 (20.9)	462 (18.2)	145 (14.7)	1376 (19.1)
E. Non urgent referral				
Cough >30 days	4 (0.1)	2 (0.1)	14 (1.4)	20 (0.3)
Fever >7 days	29 (0.8)	14 (0.6)	8 (0.8)	51 (0.7)
<i>Subtotal</i>	33 (0.9)	16 (0.6)	22 (2.2)	71 (1.0)

^a Values in parentheses are percentages.

^b Most children with severe dehydration can be managed at a first-level facility and only some need to be referred.

food, fluids, and drugs. For the most part in Uganda and the United Republic of Tanzania, clinical officers were authorized to perform functions such as prescribing injectable drugs, reading blood slides for malarial parasites, giving blood, and incising abscesses.

In addition to the staff mentioned above, clinics often have other staff with lesser or no medical qualifications, such as nursing assistants, rural medical aids, or auxiliaries. Formally, such staff are not allowed to perform any of the above

functions, although, in practice, they may be the only personnel available to do so.

Discussion

Significant improvements in post-neonatal infant mortality and childhood mortality have occurred over the last 30 years. This probably is attributable in large part to improved socio-economic conditions and secondarily to care at first-level facilities and hospitals (8). In most developing countries, more

Table 2. Classification of infants aged 1 week–2 months

Variable	No. of children ^a			
	Uganda	United Republic of Tanzania	Niger	Total
Total centres	14	3	2	19
Total children	198	109	108	415 (100)
Total classifications	471	293	248	1012
Total classification/children	2.4	2.7	2.3	2.4
Months of observation	3.5	4	5	
Bacterial infection				
Possible severe bacterial infection	94 (47.5)	86 (78.9)	49 (45.4)	229 (55.2)
Diarrhoea				
Severe dehydration ^b	31 (15.7)	69 (63.3)	25 (23.1)	125 (30.1)
Severe persistent diarrhoea	1 (0.5)	4 (3.7)	5 (4.6)	10 (2.4)
Dysentery	1 (0.5)	0	0	1 (0.2)
	3 (1.5)	0	2 (1.9)	5 (1.2)
Feeding problem				
Unable to feed	159 (80.3)	132 (121.1)	157 (145.4)	448 (108.0)
No attachment	5 (2.5)	52 (47.7)	11 (10.2)	68 (16.4)
No suckling	4 (2.0)	51 (46.8)	2 (1.9)	57 (13.7)
	3 (1.5)	48 (44.0)	1 (0.9)	52 (12.5)

^a Values in parentheses are percentages.

^b Most young infants with severe dehydration can be managed at a first-level facility, and only some need to be referred.

health resources are available in cities and towns than in rural areas. This results in a disproportionate number of deaths occurring in rural areas (9, 10). The reduction of neonatal and infant mortality involves a continuous process of improving home-care (11), improving care-seeking behaviour (12, and CB Kartasmita, personal communication 13 May 2003), increasing management of patients at first-level facilities (4–7), improving emergency triage assessment and treatment (13, 14), and appropriately managing severely ill children in hospitals (15–17). Along this chain of management of sick children, the referral of a sick child from a rural first-level health facility to a hospital at the district level often is a bottleneck. This study is an initial step to assess the magnitude of referral under IMCI and to explore the possibility of managing children locally.

Limitations of the study

Lack of physician-confirmed independent verification of the classifications was a main limitation of the study. Previous studies, however, have shown that IMCI training and the presence of teaching aids, such as the case recording form and chart booklet, have helped to make the accuracy of health workers' classifications comparable with that of physicians (5). Furthermore, the situation was artificial, in that health workers were provided with IMCI case recording forms, which often are not available routinely. Supervisory visits, which also often do not actually occur, stressed the importance of complete filling of recording forms. The outcome being studied necessitated this and probably resulted in higher than usual quality for the routine data collected — and most likely in the quality of care as well. In this study, only government first-level health facilities were studied. The private sector, where greater numbers of seriously ill children may go directly, was not considered.

Frequency of conditions that required referral

The referral rate in Niger was much higher than in the United Republic of Tanzania or Uganda. This high rate of

referral probably reflected the delayed care-seeking behaviour seen in more rural areas of Niger (18). This can be deduced because of the statistically significant higher rates seen for all general danger signs (except vomiting everything), severe pneumonia, severe dehydration, and severe febrile disease. A second reason for this disparity might be that more difficult access to referral facilities in Niger meant that fewer patients with severe disease bypassed the first level of care. Other reasons could have been differences in the level of health workers who assessed patients or the fact that health workers had received different training in Niger. Assessments were done by nurses trained in IMCI in Niger and by clinical officers and nurses trained in IMCI in the United Republic of Tanzania and Uganda. In all three countries, however, country-adapted IMCI training materials (which varied very little) were used for training, and it is unlikely therefore that either the type of training or the level of health worker was responsible for the differences in classifications.

One of the principal aims of this study was to determine the proportion of children that was referred and the most common reasons for referral. The finding that about one in 10 children needed referral will be important in the development of a pathway of referral for sick children that uses IMCI guidelines. In the 691 children who should have been referred, convulsions, severe pneumonia, severe febrile disease, and severe malnutrition were the most common reasons for referral; other conditions, such as severe persistent diarrhoea and mastoiditis, were less important. Although the number of young infants seen was only about one twentieth of the number of older children, almost three-quarters of these infants would have needed referral. Our study thus established the most common of the severe classifications that would need to be managed at the first-level facility when referral is impossible.

Table 3. Supplies and equipment available at first-level health facilities

Variable	No. of centres with supply or equipment			
	Uganda	United Republic of Tanzania	Niger	Total ^a
Total centres	39	7	16	62
Equipment and supplies				
Syringes	35	7	16	58 (94)
Needles	35	7	16	58 (94)
Weighing scales	34	7	16	57 (92)
Refrigerator	34	7	16	57 (92)
Thermometer	32	7	16	55 (89)
Suction pump	13	2	0	15 (24)
Nebulizer	1	0	0	1 (2)
Oxygen supply				
Oxygen cylinder	3	0	0	3 (5)
Oxygen concentrator	0	0	0	0
Nasal cannula	0	0	0	0
Supplies				
Intravenous fluids	25	1	9	35 (56)
Intravenous set	1	6	10	17 (27)
Blood-giving set	1	1	2	3 (3)
Nasogastric tubes	6	7	6	19 (31)
Lumbar puncture needle	0	0	16	16 (26)
Malaria diagnostics				
Microscope	17	2	10	29 (47)
Blood slides	17	2	10	29 (47)
Drugs				
Intramuscular penicillin	35	7	16	58 (94)
Intravenous/rectal diazepam	26	5	15	46 (74)
Injectable quinine	24	0	15	39 (63)
Injectable chloramphenicol	10	0	14	24 (39)
Glucose (50%)	3	0	0	3 (5)

^a Values in parentheses are percentages.

Can common severe illnesses be managed at a first-level facility?

Referral is normally the best solution for a child with a serious condition, but where referral is not possible, some options can be used to manage children effectively at a first-level facility.

Children aged two months to five years

Convulsions. Of the 151 children with a history of convulsions or convulsions in the clinic, only 18 were lethargic, unconscious, or unable to drink. Children with convulsions and no other danger signs (i.e. with a normal sensorium) could be managed at a first-level facility, which would vastly reduce the number of children who needed to be referred. Smiling febrile infants under 2 months of age has been reported by one study in the USA to be 100% predictive in ruling out serious illness (19) — a finding that should be borne in mind when a diagnosis of meningitis is being considered in children with seizures. No studies have systematically examined this finding in developing countries, but it is used quite frequently in clinical practice in North America (20). In our study, 133 (88%) of children with convulsions possibly may not have required referral. No data exist, however, that would identify which children could be safely sent home, e.g. with benign febrile convulsions, and which need to be referred, e.g. with meningitis or cerebral malaria.

Table 4. Permitted health worker functions at first-level health facilities

Function	Uganda		United Republic of Tanzania		Niger
	Clinical officer	Nurse	Clinical officer/assistant clinical officer	Nurse	Nurse
Prescribe restricted drugs	Yes	Yes	Yes	Yes	Yes
Dispense restricted drugs	No	No	Yes	No	Yes
Prescribe injectable drugs	Yes	No	Yes	No	Yes
Administer intramuscular injections	Yes	Yes	Yes	Yes	Yes
Administer intravenous injections	Yes	Yes	Yes	Yes	Yes
Administer intravenous fluids	Yes	Yes	Yes	Yes	Yes
Read blood slide for malarial parasite	Yes	No	Yes	No	Yes
Perform lumbar puncture	No	No	No	No	Yes
Administer suction	Yes	Yes	Yes	Yes	No
Give oxygen	Yes	Yes	Yes	Yes	No
Give blood	Yes	No	Yes	Yes	No
Give intraosseous intravenous fluids	No	No	No	No	No
Pass a nasogastric tube	No	Yes	Yes	Yes	Yes
Give food and fluids by nasogastric tube	No	Yes	Yes	Yes	Yes
Incise abscesses	Yes	No	Yes	No	Yes

The management of a child with convulsions may need the use of a lumbar puncture needle. Such a needle was not present in any of the health centres in Uganda and the United Republic of Tanzania but was present in all facilities in Niger: this was probably because health workers in Niger were permitted to perform a lumbar puncture but neither level of health worker was allowed to in Uganda or the United Republic of Tanzania. Rectal diazepam for the management of convulsions was available in about 75% of the facilities. Similarly, although penicillin was readily available for possible treatment of meningitis in these children, second-line drugs with better cerebrospinal fluid penetration, such as chloramphenicol, were not available in most health centres. Injectable quinine, which is needed for the management of cerebral malaria, was present in about two-thirds of the health centres. Thus, an increase in supplies and equipment accompanied by training and empowerment of health workers could make managing a child presenting with convulsions possible at first-level health facilities.

Severe pneumonia. After convulsions, the most common cause of referral to hospitals was chest wall indrawing — an indicator of severe pneumonia. Lower chest wall indrawing often occurs in children with wheezing, and the use of

bronchodilators at first-level facilities could be another option to reduce over-referral (15). In studies from developing countries, an average of one-third of children with chest wall indrawing had associated wheezing (21–23). Clearly, some of these children, especially infants, have bronchiolitis, and their response to bronchodilators may not be very good. Children with recurrent wheezing, however, may respond to bronchodilators. In our study, 122 children with severe pneumonia had no danger signs. If approximately one-third of these children had wheezing disease that responded to bronchodilators, this simple measure could have reduced the rate of referral by 41 children. The remainder of children with lower chest wall indrawing would then be treated with an injectable or oral antibiotic on an outpatient basis at the health centre. Current studies supported by WHO aim to determine the safety of oral treatment regimens in such children.

Several studies have examined simple clinical signs to differentiate between hypoxaemic and non-hypoxaemic pneumonia (24–26). These signs, or the use of a pulse oximeter, could reduce the number of children referred, as only those who were hypoxaemic would need to be sent to hospital. Oxygen cylinders or oxygen concentrators were present in just 5% of health centres. As oxygen has to be given continuously, the only solution in settings in which hypoxaemia contributes considerably to the burden of illness and where referral is not possible would be to upgrade the first-level facility to a hospital that provides inpatient care, including oxygen.

Severe febrile disease. The management of severe febrile disease is linked closely with the management of convulsions. From our study, an algorithm that safely identifies children with febrile seizures would probably reduce the number of children who require referral because of severe febrile disease by about 50%. Most of the remainder, however, would have alterations of sensorium and/or a stiff neck, indicating meningoencephalitis. A recent study of 2097 children aged two months to three years with fever showed that 51 had a confirmed diagnosis of bacterial meningitis (27). A combination model of a history of convulsions, being lethargic or unconscious, or having a stiff neck (as used in the IMCI guidelines) had a sensitivity of 98% and a specificity of 72% for predicting meningitis. Regardless of treatment, however, mortality from bacterial meningitis in developing countries, even at tertiary care hospitals, ranges between 31% and 50% (29–31), and mortality from cerebral malaria approaches 20% (31, 32). For lethargic or unconscious children, the treatment of both possible conditions (acute pyogenic meningitis and cerebral malaria in malaria-endemic regions) with intramuscular chloramphenicol and intramuscular quinine may be the only option at present.

Severe malnutrition. Training and empowerment of health workers might lead to the management of children with severe dehydration, severe persistent diarrhoea, and severe malnutrition at first-level facilities. Severe malnutrition and severe dehydration primarily need monitoring and, for the former, around-the-clock supervision is needed (17). Even under these circumstances in district hospitals, mortality in children with kwashiorkor ranges from 10% to 20% (33, 34). Once again, few trials have examined the implementation of management regimens for child with severe malnutrition at first-level facilities (36, 37), and this needs to be pursued.

Summary. Altogether, the suggestions outlined above may allow for first-level management of up to one-half of the

children who currently are considered to need referral according to the IMCI classification.

Sick young infants

The number of sick young infants referred because of severe disease constitutes almost one-half of all children referred. In young infants, it has always been difficult to differentiate serious from minor illnesses (37, 38); this is reflected by the fact that almost 75% of young infants aged one week–two months were referred to hospital. This may be because young infants are brought to health centres only when they are very ill or because of over-referral as a result of a fairly non-specific algorithm. Current knowledge does not allow for the safe management of any of these infants at first-level facilities. Studies are being undertaken in several developing countries to identify which critical signs and symptoms could be used to detect sick young infants with truly severe disease and those with minor conditions that do not require referral.

Most of the problems not covered by IMCI relate to skin and eye conditions, all of which are managed routinely at first-level facilities and would not merit urgent referral. Very few of the other conditions — most of which involve injuries and trauma — were severe enough to be referred. Surprisingly, only 0.1% of all children seen suffered from chronic diseases (cough >30 days or fever >7 days).

Supply and legal constraints

We found critical limitations in available supplies and equipment and legal constraints to providing sufficient treatment to patients with severe illnesses. No differences were seen in the supplies and equipment available at the 19 facilities from which referral was difficult and the 43 from which it was not, hence the data for all 62 were presented. Examination of supplies at 62 facilities in the three countries showed striking similarities. Although equipment was available for routine management of patients (syringes, needles, weighing scales, thermometers, etc.), equipment and supplies for emergency management of patients with possible life-threatening situations (e.g. oxygen cylinders, suction pumps for suctioning the throat, and blood-giving sets) were available at only a few centres. This reflects the current bias of managing non-severe conditions at first-level facilities and also illustrates major difficulties that would be encountered should guidelines be developed for the management of severely ill patients at first-level facilities. Our study identified the frequency of common conditions that need referral, but much more research is needed to determine which of these illnesses can be managed safely at first-level facilities. Once this is known, the necessary supplies and equipment can be defined and case-management guidelines developed. The inventory that we have taken points to a broader problem in the provision of supplies for the management of sick children and adults at first-level facilities. At the 19 first-level facilities at which referral was difficult or impossible, an average of three to five children were seen a day (approximately one-tenth of these would have a severe IMCI classification). Health facility surveys, such as ours, as well as a careful examination of the legal issues involved, may be critical when national governments are developing and adapting case-management guidelines for severely ill children in situations in which referral is impossible.

Legal constraints limit the tasks that a health worker can perform, and required supplies are not made available for fear

of misuse. In addition, health workers have not been trained to treat severe illnesses. Clearly, the best solution where referral is not possible is to make referral possible. This could be achieved by expanding health facilities to provide inpatient care and deploying qualified staff. Where a government chooses not to, or cannot, make referral possible, health workers should be better trained to manage these children, legal constraints should be removed, and drugs and supplies should be made available at first-level facilities. ■

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Résumé

Prise en charge des enfants gravement malades et dont le transfert est difficile dans les centres de premier niveau en Afrique subsaharienne

Objectif Nous avons cherché à quantifier en Afrique subsaharienne les causes principales du transfert des enfants et des nourrissons du premier niveau de soins vers les hôpitaux et à déterminer le matériel, les fournitures et les moyens juridiques qui permettraient de prendre ces enfants en charge lorsque leur transfert est difficile.

Méthodes Une étude d'observation réalisée dans des centres de santé de premier niveau en Ouganda, en République de Tanzanie et au Niger pendant 3-5 mois a consisté à recueillir prospectivement les données concernant le diagnostic et la gravité des affections de l'enfant en s'appuyant sur les recommandations pour la prise en charge intégrée des maladies de l'enfant (PCIME). Les moyens en matériel et en fournitures dont disposent les centres ont été examinés, ainsi que les contraintes juridiques appliquées aux soignants de ces centres.

Résultats Nous avons examiné 7195 enfants de 2 à 59 mois ; un diagnostic grave dans la classification PCIME nécessitant un transfert

urgent à l'hôpital a été porté chez 691 d'entre eux (soit 9,6 %). Sur l'ensemble, 226 enfants ont manifesté des signes généraux de danger, 292 avaient une pneumonie grave ou une maladie très grave, 104 avaient une déshydratation sévère et 31 une diarrhée persistante sévère ; 207 étaient gravement malnutris et 98 avaient une anémie sévère. Une maladie extrêmement grave a été observée chez 415 jeunes nourrissons d'une semaine à 2 mois, dont près des trois quarts avaient besoin d'être transférés. Les contraintes juridiques ainsi que l'absence de matériel simple (pompes d'aspiration, générateurs d'aérosol, concentrateurs d'oxygène) et de fournitures (sondes nasogastriques et glucose à 50 %) ont parfois empêché une prise en charge plus appropriée des enfants malades quand le transfert était impossible.

Conclusion Quand le transfert est difficile ou impossible, un supplément de matériel et de fournitures ainsi que des recommandations simples pourraient améliorer la prise en charge de l'enfant et du nourrisson gravement malades.

Resumen

Manejo de los niños gravemente enfermos y de difícil derivación en los servicios de salud de primer nivel en el África subsahariana

Objetivo Decidimos cuantificar las razones principales de la derivación de los lactantes y niños de los establecimientos de salud de primer nivel a los hospitales de derivación en el África subsahariana, así como determinar qué suministros, equipo y empoderamiento competencial adicionales podrían requerirse para manejar a esos niños cuando resulta difícil derivarlos.

Métodos En un estudio observacional realizado a lo largo de 3-5 meses en centros de salud de primer nivel de Uganda, la República Unida de Tanzania y el Níger, procedimos a documentar prospectivamente los diagnósticos y la gravedad de las enfermedades sufridas por los niños utilizando las directrices normalizadas de la Atención Integrada a las Enfermedades Prevalentes de la Infancia (AIEPI). Determinamos los suministros y el equipo de que disponían los servicios y examinamos las competencias del personal de salud que trabajaba en ellos.

Resultados Estudiamos a 7195 niños de 2-59 meses de edad, de los cuales 691 (9,6%) fueron clasificados según los criterios de la

AIEPI como afectados por una enfermedad grave que requería derivación urgente a un hospital. Globalmente, 226 niños presentaron signos generales de peligro, 292 neumonía severa u otra enfermedad muy grave, 104 deshidratación grave, 31 diarrea persistente severa, 207 malnutrición grave, y 98 anemia grave. El estado de 415 lactantes de entre una semana y dos meses fue considerablemente peor: casi las tres cuartas partes requirieron derivación. Las restricciones competenciales y la falta de equipo (bombas de aspiración, nebulizadores y concentradores de oxígeno) y suministros (sondas nasogástricas y glucosa al 50%) básicos pueden ser un impedimento para que los trabajadores sanitarios manejen idóneamente a los niños enfermos cuando la derivación resulta imposible.

Conclusión Cuando la derivación es difícil o imposible, el hecho de proporcionar algunos suministros y equipo, así como directrices sencillas, puede redundar en una mejora del manejo de lactantes y niños gravemente enfermos.

التدبير العلاجي للأطفال المصابين بمرض بالغ الوخامة في المرافق الصحية الأولية في البلدان الواقعة جنوب الصحراء الأفريقية عندما يصعب إحالتهم

عاجل إلى المستشفيات. وكان لدى ٢٢٦ منهم علامات خطيرة، ولدى ٢٩٢ منهم التهاب رئوي وخيم، أو مرض شديد الوخامة، وكان ١٠٤ منهم يعانون من تحنات وخيم، و٣١ منهم يعانون من إسهال مستديم، و٢٠٧ منهم يعانون من سوء تغذية وخيم، و٩٨ منهم يعانون من فقر دم وخيم، وكان الأطفال الذين يبدون مظاهر مرض ظاهر الخطورة ٤١٥ رضيعاً تتراوح أعمارهم بين أسبوع وشهرين، وقد احتاج ثلاثة أرباعهم إلى الإحالة. إن وجود قيود تشريعية وعدم توافر المعدات البسيطة مثل مضخات شفط المفرزات والمزادات وأسطوانات تركيز الأكسجين، ونقص الإمدادات بأنابيب مص مفرزات المعدة ومحلول الغلوكوز المركز ٥٠٪ يعيق العاملين الصحيين من الأداء بشكل أفضل لخدمة الأطفال المرضى إذا لم يكن بالإمكان إحالتهم.

النتيجة: عندما تصبح الإحالة متعسرة أو متعذرة، يمكن لبعض الإمدادات والمعدات، إلى جانب توافر دلائل إرشادية بسيطة، أن تحسن من التدبير العلاجي للأطفال الرضع الذين يعانون من مرض وخيم.

الهدف: سعياً إلى تحديد الأسباب الرئيسية لإحالة الأطفال والرضع من المرافق الصحية الأولية إلى مستشفيات الإحالة المرجعية في البلدان الواقعة جنوب الصحراء الأفريقية ومعرفة مقارها، والإمدادات والمعدات وسبل التمكين التشريعية التي ينبغي توفيرها للتدبير العلاجي لمثل هؤلاء الأطفال عندما يصعب إحالتهم.

الطريقة: لقد قمنا بشكل استباقي بتوثيق تشخيص ووخامة المرض بالاستناد إلى الدلائل الإرشادية للتدبير العلاجي المتكامل لأمراض الطفولة بإجراء دراسة مراقبة وملاحظة على المستوى الأول من المرافق الصحية في أوغندا وجمهورية تنزانيا المتحدة والنيجر على مدى ٣-٥ سنوات. وقد قمنا باستعراض تلك المرافق وما فيها من معدات وإمدادات ودرسنا القيود التشريعية التي تعيق عمل العاملين الصحيين في تلك المرافق.

الموجودات: شملت الدراسة ٧١٩٥ طفلاً تتراوح أعمارهم بين ٢ و٢٩ شهراً وتم تصنيف ٦٩١ طفلاً منهم (٩,٦٪) ضمن الفئة الوخيمة وفق تصنيف التدبير العلاجي المتكامل لأمراض الطفولة، واحتاجوا للتحويل بشكل

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