Does stewardship make a difference in the quality of care? Evidence from clinics and pharmacies in Kenya and Ghana

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Abstract

Objective. To measure level and variation of healthcare quality provided by different types of healthcare facilities in Ghana and Kenya and which factors (including levels of government engagement with small private providers) are associated with improved quality.

Design. Provider knowledge was assessed through responses to clinical vignettes. Associations between performance on vignettes and facility characteristics, provider characteristics and self-reported interaction with government were examined using descriptive statistics and multivariate regressions.

Setting. Survey of 300 healthcare facilities each in Ghana and Kenya including hospitals, clinics, nursing homes, pharmacies and chemical shops. Private facilities were oversampled.

Participants. Person who generally saw the most patients at each facility.

Main Outcome Measure(s). Percent of items answered correctly, measured against clinical practice guidelines and World Health Organization’s protocol.

Results. Overall, average quality was low. Over 90% of facilities performed less than half of necessary items. Incorrect antibiotic use was frequent. Some evidence of positive association between government stewardship and quality among clinics, with the greatest effect (7% points increase, \( P = 0.03 \)) for clinics reporting interactions with government across all six stewardship elements. No analogous association was found for pharmacies. No significant effect for any of the stewardship elements individually, nor according to type of engagement.

Conclusions. Government stewardship appears to have some cumulative association with quality for clinics, suggesting that comprehensive engagement with providers may influence quality. However, our research indicates that continued medical education (CME) by itself is not associated with improved care.

Keywords: health policy, quality of health care, developing countries, infantile diarrhea

Introduction

Health services of variable and sometimes questionable quality are delivered to patients all over the world, with concern that only suboptimal quality is available to the most vulnerable patients in developing countries [1–8]. The problem is especially pronounced in the Africa region, which has long been known for its high burden of diseases and some of the lowest doctor–patient ratios in the world [9]. There has been relatively little targeted research on the quality of care in Africa, and little of this has been done on the quality of care at pharmacies and chemical shops, which are often the most widely accessed providers in developing country settings with relatively few doctors. Many governments, regulatory boards and organizations are now focusing on improving quality through strengthened oversight mechanisms. The World Health Organization and others are offering support for improved oversight and efforts to improve stewardship not just for public but also for private
providers [10, 11]. These efforts may be hampered by the
dearth of systematic information on provider quality and factors
responsible for deficiencies in quality [12].

We conducted a study to help fill the gap in knowledge
about the quality of health services. The objective of our study
is to measure in two countries in Africa, Ghana and Kenya,
the level and variation of quality available from different
healthcare providers and the factors associated with improved
quality. In particular, our goal was to evaluate whether higher
levels of government engagement (elements of stewardship)
with small private providers, including pharmacies and chem-
ical shops, are associated with differences in quality of care
that the providers offer. We do not attempt to assess steward-
ship in a comprehensive way [10] but instead ask whether
elements of government engagement or stewardship (used
interchangeably here) have reached the health providers and
whether such interactions are associated with higher quality
of care.

Methods

Measurement using quality vignettes

The quality of healthcare can be assessed along three dimen-
sions: the structural characteristics of health facilities (e.g.
beds, medical equipment), the process of care (e.g. the pro-
vider–patient interaction) and the health outcomes of the
population (e.g. infant mortality rates) [13, 14]. Process of care
may be especially important in low-income settings because
process transforms healthcare system inputs into better health
status. Process measures are also useful in judging the quality
of care providers give to their patients.

A major component of quality is competence (technical
knowledge and skills) of the health service provider [7, 13],
which can be studied using clinical vignettes [14]. Clinical per-
f ormance vignettes have been validated as a tool for assessing
the competence of healthcare providers as a proxy for the
quality of services they are capable of providing [1, 5, 15, 16].
The validity of vignettes as a measurement tool for quality has
been found to remain regardless of the level of training of the
provider or the site of the study [2]. In some studies, vignettes
were said to measure the upper bound of quality that a pro-
vider is capable of supplying, whereas the actual quality of care
provided was found to be lower under real-life observations
[3–5]. Other studies have found that physicians do more for
their patients when being observed under real-life conditions
[17]. Measurement of quality using vignettes, however, is not
affected by the providers’ level of effort (the degree to which
they use their competence in daily practice), nor by selection
(which patients go to which provider for which condition).
Thus, they may be useful for comparative studies among dif-
ferent types of providers, healthcare facilities and countries.

Study setting and participants

We performed a cross-sectional survey of healthcare providers
in a sample of hospitals, clinics and pharmacies in Ghana and
Kenya in the fall of 2010. The two countries were selected
based on our knowledge of their health systems, government
policies and private health sectors. Both Ghana and Kenya
have a mixed health system where public and private sector
health service providers operate with few restrictions and little
regulatory oversight or opportunities for continuing education.
While clinical guidelines exist for the management of child-
hood diarrhea and public education campaigns on the utility
of oral rehydration salts have been performed, in 2010 there
were no systematic attempts to ensure that providers adhere to
the guidelines.

The sampling frame in each country was based on a census
of health facilities in districts that were purposively chosen to
be geographically and economically diverse. In each country,
we selected a stratified random sample of 300 hospitals,
clinics, nursing homes and pharmacies, oversampling private
hospitals and clinics. The sampling was designed to capture
a range of health facility types, with a focus on smaller, private
sector firms (see Sood et al., 2011) [18].

The sample frame in Ghana was based on a 2010 health fa-
cility census carried out by the Results for Development
Institute. We excluded laboratories and medical device manu-
facturers from the census, leaving a sample frame of 647 facil-
ities. We surveyed 300 facilities, oversampling hospitals and
clinics, achieving a 90% response rate in Ghana (among a total
of 333 facilities visited). In Kenya, we drew our sample from a
list of 1920 hospitals, clinics and nursing homes developed
jointly by the Ministry of Health and KEMRI-Wellcome Trust
combined with 1948 pharmacies that TNS Opinion developed
through a retail census. As in Ghana, we randomly sampled
300 facilities from the combined sample frame, oversampling
hospitals and clinics. Response rates in Kenya were lower than
in Ghana, at 69% (among a total of 435 facilities visited).

The primary respondent at each facility was a staff person
responsible for managerial activities, but responses to struc-
tured clinical vignettes were obtained from a medical staff
person (defined as the person who generally sees the most
patients). In some cases, particularly for smaller facilities, the
managerial and medical responses were provided by the same
individual, but each survey question was answered by only one
respondent. Although we surveyed 300 facilities per country,
not all facilities completed the clinical vignette in addition to
the main facility survey. Therefore, due to supplemental non-
response and a limited number of data coding issues, the total
sample size for completed vignettes is 500 facilities: 207 clinics
(including 36 hospitals) and 293 pharmacies (including 82
chemical shops). Fig. 1 shows the sample structure.

Vignette description and administration

The particular vignettes selected for this study described a
hypothetical child with diarrhea (acute gastroenteritis of viral
etiology) and moderate dehydration. Diarrhea is the second
leading cause of child deaths worldwide, responsible for 15%
of deaths in children under the age of 5 [19]. It is a preventable
cause of death in children, yet it remains a major killer, espe-
cially in developing countries [20]. It ranks among the top five
causes of death for the entire population in both Ghana and
Kenya [9], and private providers are a major source of care in both countries [21, 22].

Characteristics of the case were designed to be typical to those that would normally be taken to the pharmacy or clinic for care [see Appendix for the specific vignettes, which are largely based on the Clinical Performance and Value vignette model developed and validated by Peabody et al. (2004)] [1]. The same vignettes were administered in both countries. The vignettes administered to the pharmacies and chemical shops, however, were simplified to present a more appropriate case for these facilities, with fewer clinical details. Enumerators presented the cases to providers and requested them to provide responses based on the information they were given about the patient. Responses were requested, without prompting on specific items or actions, for each of five domains of care: history, physical examination, laboratory tests (this domain was not included for pharmacies in the sample), diagnosis and clinical treatment or management. In each domain, the enumerator did not move on to the next question until the provider’s responses were recorded.

Additional information was provided on patient history and physical examination after the provider completed those domains, so respondents were given information they might not have otherwise elicited when caring for a real patient (such as details about the actual condition that would come from a thorough examination). This approach enables the vignette to assess competence in each domain of care independent of the others. The open-response format was designed to approximate the normal behavior of the healthcare provider when faced with a patient.

### Scoring

Each vignette was scored by a trained abstractor, blinded to any provider characteristic. Open-ended provider responses were compared against explicit evidence-based checklist of scoring criteria. These scoring criteria comprised of a list of ‘necessary items’, derived from clinical practice guidelines and the World Health Organization’s protocol for the management of infants and children with diarrhea [23]. A select list of the quality criteria for each of the vignette domains is provided in Appendix. Items that providers correctly identified on their answer sheets were scored as a correct response. The total ‘necessary items’ was a simple sum of the scores across the five domains for the clinics, and across the four domains of care for which the pharmacies were assessed. Preventive care and unnecessary items were scored and tallied separately.

To ensure consistency, 40% of the vignettes were randomly assigned for double scoring with a supervising abstractor.
Reconciliation between the supervisor and the abstractors was conducted to identify and decide upon specific items on the vignettes not immediately captured by the scoring form. Decisions on issues encountered in the course of scoring the vignettes were compiled and used as a reference in cases where the specific items were again encountered.

**Outcome measure and analysis**

The main outcome measure for each respondent was the ‘percentage of necessary items’ identified by the respondent. Descriptive statistics were generated by the type of facility and disaggregated according to the level of the health facility and provider type. We performed t-tests and analyses of variance on average outcomes for each category described earlier.

To assess the association between stewardship and quality of care, we used the providers’ responses to several questions about government engagement with their facility. We developed an index comprised of six stewardship elements: receipt of technical assistance for continuing education, receipt of technical assistance for quality assurance or receipt of information on clinical practice guidelines, as well as having completed quality compliance reports, being registered with the Ministry of Health and having been inspected during the past 2 years.

The data on stewardship elements were as reported by the surveyed providers since the objective was to find out how government policies affect their practice. This index was then incorporated into a regression model assessing the percentage of necessary quality items as the outcome while controlling for differences among the providers.

We determined the influence of government engagement with providers, structural measures of quality, as well as other provider and facility characteristics on the outcome of percentage of necessary items by ordinary least-squares simple and multiple linear regressions. We also developed a model to predict appropriate treatment of childhood diarrhea—antibiotic versus oral rehydration salts, based on provider and facility characteristics.

**Results**

The average outcome (percentage of necessary items) and standard deviations for hospitals/clinics versus pharmacies/chemical shops are compared in Table 1. Overall, the average quality scores for the two types of providers were low. There was a distinct difference and high variability in the quality vignette scores for the two categories of respondents as displayed in Fig. 2. Pharmacy and chemical shop respondents averaged 39.1% (median: 39.1%) of the necessary items whereas respondents in hospitals and clinics had an average score of 30.7% (median: 31.0%) of the necessary items in their own vignette. Since the vignette for pharmacies and chemical shops was designed to have less clinical detail, it was easier to get a higher score. More than 90% of the providers in both Kenya and Ghana identified less than half of the necessary items. As shown in Fig. 2, the wide variation in the outcome was more pronounced for the pharmacy category. Across domains, we observed that the pharmacies scored relatively low on history taking compared with the other domains and, unlike the clinics, scored relatively higher in the treatment domain.

Table 2 shows the change in quality (represented by percentage necessary outcome) as a function of provider and facility characteristics, as well as the index of stewardship at both the clinic and pharmacy levels.

Higher level of provider training was associated with significantly better quality, and the doctors in the clinic sample performed better than the other providers. Similarly in the pharmacy model, provider training was associated with improved performance, with nurses and pharmacists again performing better than other providers. Stewardship and quality were associated within the clinic model particularly for those clinics reporting all six elements of the stewardship index (7% points higher quality score, \( P = 0.03 \)). We found no association between stewardship and quality for pharmacies. When we separated the stewardship elements into two groups, assessing separately the impact of requirements (quality reports, registration status and inspection) and assistance...
(continuing education, support on quality assurance and information on practice guidelines), we also found no significant results. Structural measures of quality were not significantly associated with higher vignette scores after other predictors were added to the model. Also, public versus private ownership was not associated with quality. Comparing quality between the two countries, Kenyan clinics and hospitals had significantly higher scores than Ghanaian clinics and hospitals \((P = 0.01)\), but we saw no difference between countries in quality scores for pharmacies and chemical shops.

Table 3 presents the quality of care available to children with diarrhea. Only 39.1% of all providers correctly diagnosed acute gastroenteritis, and even fewer (14.4%) correctly identified the problem as being of viral etiology. Finally, just one-tenth of the providers were correct on both disease diagnosis and etiology. In all three of these cases, clinic-level providers surpassed the pharmacy-based providers, by factors of 2–3. Oral rehydration therapy was used by 69.1% of the providers, with no notable differences between pharmacies and clinics. Antibiotics were prescribed by just under a quarter (22.8%) of the sample, with much higher rates of prescription by the clinics (49.3%) than the pharmacies (4.1%). We looked at the use of unnecessary antibiotic to determine whether correctly identifying the viral etiology of the case affected the use.

### Table 2  Model of quality of care by provider characteristics and government engagement

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Clinics ((n = 207))</th>
<th>Pharmacies ((N = 292)^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage point increase in quality</td>
<td>Standard error</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>-1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Male (Reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥40 years old</td>
<td>1.1</td>
<td>1.4</td>
</tr>
<tr>
<td>&lt;40 years old (Reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Educational qualification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>4.5</td>
<td>2.1</td>
</tr>
<tr>
<td>Nurse</td>
<td>1.7</td>
<td>1.8</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>2.9</td>
<td>3.1</td>
</tr>
<tr>
<td>Medical personnel (certified and non-certified) (Reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ghana</td>
<td>-4.4</td>
<td>1.6</td>
</tr>
<tr>
<td>Kenya (Reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Facility type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinic</td>
<td>0.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Others</td>
<td>-5.5</td>
<td>4.2</td>
</tr>
<tr>
<td>Hospital (Reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Government stewardship</strong> (^b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two items</td>
<td>0.2</td>
<td>3.0</td>
</tr>
<tr>
<td>Three items</td>
<td>5.5</td>
<td>2.9</td>
</tr>
<tr>
<td>Four items</td>
<td>3.8</td>
<td>3.6</td>
</tr>
<tr>
<td>Five items</td>
<td>2.6</td>
<td>3.2</td>
</tr>
<tr>
<td>All six items</td>
<td>7.0</td>
<td>3.3</td>
</tr>
<tr>
<td>0–1 item</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Structural quality</strong> (^c)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of five structural quality items present (^d)</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Affiliation of primary owner</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>-2.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Private (Reference)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)One observation was dropped by STATA.

\(^b\)The government stewardship index is comprised of self-reported receipt of technical assistance for continuing education, receipt of technical assistance for quality assurance and receipt of information on clinical practice guidelines, as well as self-reported compliance with quality reports, being registered with the Ministry of Health, and having been inspected during the past 2 years.

\(^c\)Thermometer, blood pressure tool, functioning computer, weighing scale and refrigeration equipment.
Correct Dx and etiology and unnecessary antibiotic Rx,

Correct etiology and unnecessary antibiotic Rx,

Recommended hospitalization (unnecessary action),

Prescribed antibiotics (unnecessary action),

Oral rehydration,

Discussion

However, the high rate of antibiotic use was observed even when the provider had correctly identified the viral etiology of the case (72.2%). In models, provider characteristics, such as provider education, or the level of stewardship was not associated with higher odds of appropriate treatment.

Table 3  Key item responses from vignettes

<table>
<thead>
<tr>
<th></th>
<th>Total clinics</th>
<th>Total pharmacy</th>
<th>Overall total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N = 207)</td>
<td>(N = 293)</td>
<td>(N = 500)</td>
</tr>
<tr>
<td>Acute gastroenteritis, N (%)</td>
<td>116 (56.0)</td>
<td>80 (27.3)</td>
<td>196 (66.9)</td>
</tr>
<tr>
<td>Viral etiology, N (%)</td>
<td>49 (23.7)</td>
<td>23 (7.8)</td>
<td>23 (4.6)</td>
</tr>
<tr>
<td>Acute gastro + viral etiology, N (%)</td>
<td>35 (16.9)</td>
<td>16 (5.5)</td>
<td>51 (10.2)</td>
</tr>
<tr>
<td>Oral rehydration, N (%)</td>
<td>144 (69.6)</td>
<td>202 (68.9)</td>
<td>346 (69.2)</td>
</tr>
<tr>
<td>Recommended hospitalization (unnecessary action), N (%)</td>
<td>38 (18.4)</td>
<td>37 (12.6)</td>
<td>75 (15.0)</td>
</tr>
<tr>
<td>Prescribed antibiotics (unnecessary action), N (%)</td>
<td>102 (49.3)</td>
<td>12 (4.1)</td>
<td>114 (22.8)</td>
</tr>
<tr>
<td>Correct etiology and unnecessary antibiotic Rx, N (%)</td>
<td>30 (61.2)</td>
<td>22 (7.6)</td>
<td>52 (10.4)</td>
</tr>
<tr>
<td>Correct Dx and etiology and unnecessary antibiotic Rx, N (%)</td>
<td>21 (60.0)</td>
<td>15 (5.1)</td>
<td>36 (7.2)</td>
</tr>
</tbody>
</table>

Our vignettes were administered to a wide range of providers: physicians, nurses, pharmacists and chemical shop owners. Medical providers without certificates, who were prevalent in the pharmacy category (50%), were found to have the lowest quality scores. Nearly 70% of both pharmacists and clinic workers recommended oral rehydration, but unwarranted use of antibiotics was widespread among all providers. Nearly all pharmacy workers and three-fifths of clinic workers who correctly diagnosed viral etiology still prescribed antibiotics. Continued medical education is often called upon as a strategy to improve health provider competency, specifically to correct the observed inappropriate use of medicines. However, our research also indicates that CME by itself is not associated with improved care in either the pharmacy or clinic groups.

We studied pharmacies and chemical shops because they provide substantial amounts of care in Africa. Global efforts to expand access by allowing providers to work at the ‘top of their license’ may be a useful way to expand access, but the quality of care they provide is unclear. Our research suggests that such quality concerns are well founded and ought to be addressed as part of the broader discussion of provider quality in developing countries’ health systems. Although clinics may be more effective at diagnosis, they were not more likely to provide the correct treatment. Improving quality at clinics and pharmacies may require different approaches. In light of all the attention on improving stewardship in developing countries, it is useful to acknowledge that we know relatively little about its actual impact on quality and that better information on process quality among providers and factors that influence it are needed.

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Funding

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Appendix

Full description of the two vignettes used in the study

Clinic vignette
INFORMATION 1: A mother comes to the clinic with her daughter, an 8-month-old baby. She states that her daughter has had diarrhea and is vomiting.

QUESTION 1.1: What are the most important questions you want to ask this mother about her baby’s diarrhea?

QUESTION 1.2: What are the most important questions you want to know about the baby’s medical history?

INFORMATION 2: The diarrhea started 2 days ago at the same time as the vomiting. The baby has had very loose, watery stools, without blood or mucus, in her diaper ∼6–7 times throughout the day and night. She has had a low-grade fever and has not eaten very much. She vomited 3 or 4 times yesterday but only twice today. The child has been almost weaned from breast milk, breastfeeding twice a day for the past month. Yesterday, she drank a little water from a cup but would not breastfeed. Today she has breastfed once and has been drinking some diluted mango juice. She has urinated once today, ∼6 h ago. The little girl’s older sister, aged 2, had a similar problem ∼1 week ago but the symptoms lasted only a day. She has no prior history of similar episodes, any known drug allergies or other medical problems. Her mother reports that the delivery was normal.

QUESTION 2.1: What are the most important elements of the physical examination that need to be performed on this patient? (Please be specific; for example, do not say you would ‘examine the knee’. Instead, report what you would look for when you examine the knee, e.g. ‘examined the knee for redness, swelling and point tenderness’ or ‘evaluated knee for ligamentous laxity and range of motion’).

INFORMATION 3: The child is alert and interactive, but tearful and irritable. The pulse is strong at 170 beats per minute. Temperature is 39°C. Eyes are sunken. Mucus membranes are somewhat dry. The skin pinch goes back in 1 s. The fontanel is not depressed. The head is normal without nuchal rigidity, the abdomen is mildly tender but there is no guarding, rigidity or rebound. Bowel sounds are normal. Her capillary refill time is ∼3 s. Feces in the diaper are negative for blood. Weight is 7.5 kg. Height is 0.65 m.

QUESTION 3.1: What laboratory tests would you order, if any?

INFORMATION 4: All laboratory tests are normal.

QUESTION 4.1: What is your diagnosis?

QUESTION 4.2: What do you think the etiology is?

QUESTION 4.3: Is there a secondary diagnosis? If none, write none.

QUESTION 4.4: What would the items in your treatment plan be? Include recommendations to the patient? Be specific with the generic name of the drug/s that you would recommend.

QUESTION 5.1: How many cases similar to this one came into your facility in the last month?

Pharmacy vignette
INFORMATION 1: A mother comes to you with her 15-month-old daughter, who has had diarrhea and vomiting.

QUESTION 1.1: What are the most important questions you want to ask this mother about her baby’s diarrhea?

QUESTION 1.2: What are the most important questions you want to know about the baby’s medical history?

INFORMATION 2: The diarrhea started 2 days ago, and she vomited twice. She has had no further vomiting, but her stools have been very frequent, loose and watery without blood or mucus, every time her diaper is changed. She has had a little fever and is not interested in eating food. Today she drank a little water from a cup. Mom thinks she has only urinated once in the last 8 h, but it is hard to tell because the stool is so watery. Her older sister, who is 4 years old had a similar illness 2 weeks ago but recovered in a day or so. This child has never been sick like this before. She is otherwise healthy, has no allergies, eats no unusual foods.

QUESTION 2.1: What are the most important physical issues you would want to check on this patient? (Please be specific; for example, do not say you would examine the knee’. Instead, report what you would look for when you examine the knee, e.g. ‘examined the knee for redness, swelling and point tenderness’ or ‘evaluated knee for ligamentous laxity and range of motion’).

INFORMATION 3: The child is looking around and playing with her mother’s clothes. She does look tired, but she is still moving around and active. Her color looks fine. She is smiling a little. Her lips do not look dry or cracked.

QUESTION 3.1: What is your diagnosis?

QUESTION 3.2: What do you think originally caused the problem?

QUESTION 3.3: Is there a secondary diagnosis? If none, write none.

QUESTION 3.4: What would the items in your treatment plan be? Include recommendations to the patient? Be specific with the generic name of the drug/s that you would recommend.

INFORMATION 4: Two days later, you are at work when the same mom returns with her daughter. She has tried your suggestions, but they don’t seem to have worked. The baby is keeping down fluids but is still having a large amount of
watery diarrhea many times a day and still has a little fever. The baby still looks ok and seems pretty happy and active.

**QUESTION 4.1:** What would be your medical advice in this situation?

**QUESTION 5.1:** How many cases similar to this one came into your facility in the last month? (Table A1).

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**Table A1** Select quality scoring criteria, by vignette domain: clinical and pharmacy

<table>
<thead>
<tr>
<th>Clinic</th>
<th>Pharmacy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History</strong></td>
<td></td>
</tr>
<tr>
<td>- Frequency, characteristics and duration of diarrhea</td>
<td>- Frequency, characteristics and duration of diarrhea</td>
</tr>
<tr>
<td>- Frequency, characteristics and duration of vomiting</td>
<td>- Frequency, characteristics and duration of vomiting</td>
</tr>
<tr>
<td>- Fever</td>
<td>- Fever</td>
</tr>
<tr>
<td>- Immunization history</td>
<td></td>
</tr>
<tr>
<td><strong>Physical Exam</strong></td>
<td></td>
</tr>
<tr>
<td>- Weight</td>
<td>- Weight</td>
</tr>
<tr>
<td>- Height</td>
<td>- Height</td>
</tr>
<tr>
<td>- Pulse</td>
<td>- Pulse</td>
</tr>
<tr>
<td>- Palpate abdomen</td>
<td>- Palpate abdomen</td>
</tr>
<tr>
<td>- Auscultate abdomen</td>
<td></td>
</tr>
<tr>
<td>- Check mucous membranes</td>
<td></td>
</tr>
<tr>
<td><strong>Laboratory Tests</strong></td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td></td>
</tr>
<tr>
<td>- Acute gastro-enteritis</td>
<td>- Acute gastroenteritis</td>
</tr>
<tr>
<td>- Viral etiology</td>
<td>- Viral etiology</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td></td>
</tr>
<tr>
<td>- ORS administered in clinic over 4 h</td>
<td>- ORS administered in facility over 4 h</td>
</tr>
<tr>
<td>- Estimate ORS based on weight/dehydration</td>
<td>- Antipyretic</td>
</tr>
<tr>
<td>- Antipyretic</td>
<td>- Recommended continued breastfeeding&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>- Recommended continued breastfeeding</td>
<td>- Vitamin A, zinc, calcium supplementation&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>- Vitamin A, zinc, calcium supplementation</td>
<td></td>
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</tbody>
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<sup>a</sup>Respondent was prompted.