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Improving quality of care of children in community clinics: an intervention and evaluation in Bangladesh

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ABSTRACT

Setting: Community health-care providers (CHCPs) in 40 rural community clinics of Comilla district, Bangladesh, were trained using a newly-developed case-management job aid based on 'integrated management of childhood illness' and a communication guide.

Objectives: To assess change in knowledge of CHCPs after training; absolute quality of care provided by CHCPs (determined as proportion of under-five children correctly diagnosed, treated and referred); and CHCPs' consultation behaviour.

Design: Change in knowledge was assessed by pre- and post-tests. Quality of care was determined by reassessments at clinic exit by a medical officer, without baseline comparison. Consultation behaviour was assessed through direct observation. The study was performed during 2014-15.

Results: CHCPs' mean standard knowledge score increased from 19 to 25 ($P<0.001$). Of 1490 under-five children examined, 91% were correctly diagnosed, 86% correctly treated and 99.5% received a correct referral decision. CHCPs performed well on most measures of good communication - though one-third did not explain diagnosis and treatment to patients.

Conclusion: The training was effective in changing knowledge. CHCPs applied the knowledge gained and provided good quality care. Following these results, the Bangladesh Ministry of Health and Family Welfare has scaled up the training nationwide. The lessons learnt should be useful for other countries.

INTRODUCTION

Globally, the under-five mortality rate has halved since 1990.[1] South Asia has achieved an equivalent reduction, but under-five mortality remains unacceptably high at 52.5 deaths/1000 live births. Sick children's first point of contact with health services is usually primary care. However, in low-income countries, primary care quality is often poor. Additional supply-side factors causing poor outcomes include lack of information on sources of care, distance of health facilities from home, high access costs and staff discrimination; demand-side factors causing low utilisation by the poor include beliefs that care is of poor quality, cultural and social belief systems, and lack of awareness of the value of services.[2 3]

In Bangladesh, the under-five mortality rate remains high, at 46 per 1000,[4 5] half of which are due to acute respiratory infections, serious infection and diarrhoea. Effective case management through trained healthcare providers could prevent many of these deaths.[6] To improve access to care, utilisation and equity, the Ministry of Health and Family Welfare (MOHFW) has initiated the *Revitalization of Community Health Care Initiatives in Bangladesh* (RCHCIB) project, which aims to provide community clinics (CCs) – with catchments of approximately 6,000 people – in rural areas, to deliver an essential service package for women, children and the poor. So far, about 13,309 CCs have been built.

CCs are staffed by Community Health Care Providers (CHCPs). CHCPs are meant to provide health education, health promotion and treatment of minor ailments, and identify and refer severe cases to hospitals. CHCPs are given monthly supportive supervision by the Sub-Assistant Community Medical Officer (SACMO) of the upazilla (subdistrict) in which the CC lies. SACMOs are trained medical professionals – the level above CHCPs, using similar clinical skills (i.e. not doctors) – who provide healthcare services at Upazilla Health Complexes (UHCs) (the first level of health facility staffed by doctors).

In response to concerns of the Project Director of the RCHCIB project and the Line Director of the Essential Service Delivery Programme about poor quality of care, a

programme review was conducted. This indicated that although CHCPs received twelve weeks training – six weeks in class acquiring mainly theoretical knowledge followed by six weeks observing doctors practice – they lacked practical consultation and communication skills. Based on the assessment of patient records by a medical doctor, a rapid pre-intervention study at 5 CCs, selected using convenience criteria, confirmed the Project Director's concerns by demonstrating that only 29% of children received proper diagnosis and care (Table 1). We also estimated that 90% of children who did not need antibiotics received them. To address these issues, we developed a diagnostic and case management job aid adapted from existing Integrated Management of Childhood Illness (IMCI) guidelines[10] and communication guidelines (pre-tested in Kaliganj – a non-study upazila – and revised accordingly), and trained all (standard) CHCPs in the study sites. It was anticipated that this would result in higher-quality care, contribute to improved utilisation of community clinics and ultimately help reduce under-five mortality.

The timeframe for this 'embedded' research was extremely tight, with a short deadline to develop and pilot the intervention before the Ministry of Health undertook nationwide training. This political reality gave us little opportunity to perform a major assessment of quality of care prior to intervention implementation. Furthermore, prior quality of care was sufficiently poor that we considered it preferable to assess absolute quality of care to allow programme managers to judge whether this level of quality was adequate, rather than measure improvement in care (since we could have found statistically significant improvements even though care quality was still inadequate). Specific objectives were to determine CHCPs' knowledge and consultation behaviour after training; and to determine the proportion of under-five patients seen by CHCPs who received the correct diagnosis, correct treatment (including rational use of antibiotics) and appropriate referral when necessary.

METHODS

Study design

The study used a cross-sectional approach to assess quality of care, and pre-post testing to assess change in CHCPs' knowledge. The study population comprised all under-five children who attended the selected CCs, and the CHCPs who cared for them, from August 2014 to February 2015.

To assess the change in knowledge following training, CHCPs were pre- and post-tested (immediately before and after training) using 12 multiple choice questions (MCQs) and 3 case studies addressing the process and content of service delivery. MCQs and case studies were pre-tested for clarity and relevance in Kaliganj with 23 CHCPs, and revised accordingly. To assess the CHCPs' diagnosis, treatment and referral post-intervention, at each selected CC, every under-five child examined for six consecutive days was re-assessed at exit by a SACMO situated in a separated room within the CC. SACMOs were not previously known to the CHCPs, but CHCPs were aware they would be assessed. To assess the CHCPs' communication with the patient/carer, on the final day of assessment a social researcher observed consultations and completed a checklist.

Setting

The study was carried out in two sub-districts of Comilla, a peri-urban district about 100 kilometres from Dhaka with a population of 3.74 million.[7] Comilla has 16 upazillas, from which we selected two – Daudkandi and Chandina – purposively to avoid overlap with other RCHCIB NGO partner projects, and to approximate the national average patient load of 45 patients per day per CC. Daudkandi and Chandina have respectively 23 and 27 functioning CCs serving approximately 16,000 and 15,000 under-five children yearly.[8 9] CCs were situated from 7 to 25 kilometres from their UHC. Of the 50 CCs, 40 (20 from each upazilla) were non-randomly selected to ensure a range of geographical locations, distances from their UHC, knowledge levels (assessed using pre- and post-test exams), and equal numbers of male and female CHCPs. Study CCs were not

atypical of CCs nationally, being a mix of rural CCs, peri-urban CCs and very remote CCs (up to 25 km from their UHC). Study CCs may not be representative of some CCs in the hill areas of Chittagong and remote coastal areas, which are difficult to access and possess unique features.

Intervention and training

All study CHCPs underwent six days of refresher training during April-June 2014, facilitated by the RCHCIB project and a member of our study team. Eight of the 37 sessions during this training covered IMCI[10] guidelines. The intervention and training package included five new components: (1) a job aid[11] to facilitate the effective management of six common illnesses, based on IMCI, including guidance on appropriate use of antibiotics; (2) training on 'how to diagnose and treat'; (3) training on how to communicate with the child and caregiver; (4) IMCI user guidelines describing how to use the IMCI job aid; and (5) training modules including case studies and role-play exercises. The package was developed shortly prior to the training in January-March 2014 by a national technical working group committee comprised of national and international experts in relevant health disciplines, social science and public health. Following the training the CHCPs were expected to keep the job aid and guide on their desks for ready reference during consultations. A simple referral mechanism was included in the IMCI job aid to strengthen referral of complicated cases.

Data collection procedures

One fieldworker was appointed in each upazilla to communicate with CCs and manage data collection. Fieldworkers received training on data collection tools and procedures. Two SACMOs, one from each UHC, were selected to assess CHCPs' skills with permission from upazilla authorities. The SACMOs spent six consecutive working days at each CC assessing all the CHCP's consultations with under-five children. Each child was then re-assessed by the SACMO blind to the CHCP's consultation. At the end of each day the SACMO matched his own register to the CHCP's register and, using a pre-developed reporting form, recorded all consistencies and inconsistencies. On the sixth day, a researcher observed the CHCP's consultations to assess the CHCP's

communication skills and completed a pre-developed consultation observation checklist. At the end of the sixth day the SACMO gave feedback to the CHCP on each consultation. All data were collected using pre-tested structured tools.

Data entry and analysis

All data from SACMO reporting forms were checked, and analysed using SPSS (version 23). Performance of CHCPs was assessed using outcomes measuring the proportion of under-five children:

1) who received the correct diagnosis
2) who received the correct treatment
3) who received appropriate referral services, when necessary
4) for whom antibiotics were used rationally (antibiotics given when recommended in the job aid and not given when not recommended).

The study was powered to estimate 95% confidence interval widths of at most ±10% for the outcomes for each type of disease, which implied identifying at least 120 cases of severe pneumonia.

A knowledge score was calculated based on responses in pre- and post-training tests, and mean change in scores was assessed using a paired t-test. Simple frequencies and proportions, and their 95% confidence intervals (calculated using the Clopper-Pearson exact method[12]), were used to describe the consultation performance and behaviour of CHCPs and make inferences about the effectiveness of the training.

Ethics

Ethics approval was obtained from the Bangladesh Medical Research Council (BMRC) and the University of Leeds, UK. Written informed consent was obtained from all respondents and CHCPs before interview.

RESULTS

Overall, 1501 under-five children attended the 40 CCs during the study. Eleven children had missing data; analysis is therefore restricted to 1490 (99%) children. Half (51%) of all children were females, and the median age was 2 (interquartile range 1-3) years. The most common presentations were 'No pneumonia (cough or cold)' (67% of patients), fever and diarrhoea (Table 2). A total of 17 (1%) children had severe disease requiring referral to a UHC.

Quality of care

Overall, 91% (95% CI 89-92%) of children were correctly diagnosed, 86% (95% CI 84-87%) were correctly treated and almost all received a correct referral decision by the CHCP (99.5%: 95% CI 99-99.8%) (Table 3). Only one child who required referral was missed by the CHCP (Table 3). Excluding severe pneumonia, for which there were only two cases (and therefore accurate inference is not possible), correct diagnosis was lowest for pneumonia (68%: 95% CI 53-80%), with much higher levels of correct diagnosis for all other diseases (Table 4).

Rational use of antibiotics

Overall, 89% (95% CI 87-91%) of consultations resulted in the correct use of antibiotics, comprising 89% (95% CI 81-93%) of consultations requiring an antibiotic that correctly resulted in their use, and 89% (95% CI 87-91%) of consultations not requiring an antibiotic that correctly did not result in their use (Table 3). The correct use of antibiotics was lowest for children presenting with 'No Pneumonia (cold or cough)' (86%: 95% CI 83-88%) and pneumonia (88%: 95% CI 76-95%), with high levels of correct antibiotic use for all other diseases (Table 4).

Change in knowledge of CHCPs

The mean knowledge score (maximum 30) before the training was 19 (SD 16-22) which increased to 25 (SD 23-27) after the training ($p<0.001$).

Consultation behaviour of CHCPs

CHCPs performed well on most measures of good communication. However, about half interrupted the child's parent or carer while they were talking, around one-third did not explain the diagnosis and treatment, and slightly less than one-third failed to provide preventive messages to the patients (Table 5).

DISCUSSION

We found that following the training, CHCPs were able to correctly diagnose, treat and refer 86% of under-five children cared for. The pre/post training evaluation showed a highly significant and clinically meaningful increase in knowledge based on the content of the job aid. These findings indicate that CHCPs' knowledge gained in training was applied in clinical practice, and justify the decision of the MOHFW to roll out the refresher training countrywide.

There remained some over-prescribing of antibiotics (about 11% of children were prescribed antibiotics when they should not have been), but this was less than half the rate found in the pre-intervention study – this is important given global concerns about antibiotic resistance. There were still some errors in diagnosis (9%) and treatment (14%), especially among children with respiratory symptoms (9% and 14% respectively) – these need to be addressed during supportive supervisory visits and on-the-job training. The programme managers have begun to fill remaining gaps identified in CHCP performance through electronic distance learning modules. The MoHFW has introduced distance learning, as arranging classroom-based training for the 14,000 CHCPs is very expensive and time consuming. In the next health sector programme, there are plans to arrange 6 days refresher training for all CHCPs in 2017.

An important innovation in this study is the adaptation of the IMCI job aid and training to the Bangladesh context, in line with updated World Health Organization guidance, and the country cultural and epidemiological context. For example the job aid includes an expanded fever section which recognises that most of Bangladesh is malaria-free, but that in the districts bordering Myanmar where there is malaria, a rapid malaria-diagnostic test is necessary. The resulting six page job aid is easy to use, and easily replicable and scalable[11]. The intervention contributed to a change in national policy and practice: about 14,000 CHCPs nationwide were given the job aid and trained.

A study from Ethiopia[13] which used a similar training methodology and evaluation found that health extension workers, following training, provided correct case management in

two-thirds of the under-five children, and only one-third of children with severe illness were correctly managed and referred. The performance of CHCPs in our study has been substantially better, but the reasons for this difference are unclear.

This is the first study of CHCPs performance in Bangladesh. There were several strengths in the intervention and its evaluation. The study had a large sample size. The intervention was designed and developed to be replicable, scalable and sustainable within routine service. There are clear criteria for classifying severe illness that needs urgent treatment and referral. The CHCPs identified all the children needing referral, although there were far fewer requiring referral than expected: this may be because the parents go directly to the UHC when their child looks very ill.

There were some weaknesses. First, there was no systematic baseline assessment in the study sites, due to the quick programme decision to scale up CHCP trainings nationwide based on the pilot results. However, it was widely acknowledged that baseline quality of care was suboptimal and it was deemed inappropriate to divert scarce resources for baseline assessment. Second, the study was done only in 2 sub-districts, and may not be representative of the country. Third, the relatively short time interval between training and knowledge assessment measured short-term recall, and may not represent long-term learning – but the longer period between training and SACMO reassessment suggests knowledge was retained. Fourth, the CHCP was aware that a SACMO was reassessing the children and a researcher was observing the consultation behaviour. The observed quality of care may in part be due to the Hawthorne effect,[14] where increased attention during assessment in itself increases performance. Thus, the performance observed in the study may not necessarily be reflective of that expected in routine practice. Fifth, the re-assessment was conducted by two SACMOs – using a panel of clinicians would have increased the rigour of re-assessment.

In conclusion, we believe this study provides evidence to demonstrate that there are likely to be substantial benefits if countries develop tailored materials and training

300 packages for lower-level health workers. These should be based on current WHO IMCI
301 guidance.[10]

302

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320 **CONFLICTS OF INTEREST**

321 None declared

322

REFERENCES

[1] Liu L, Johnson HL, Cousens S, et al. Global, regional, and national causes of child mortality: An updated systematic analysis for 2010 with time trends since 2000. Lancet 2012; 379: 2151-2161. Available from: http://dx.doi.org/10.1016/S0140-6736(12)60560-1

[2] Ahmed S, Khan MM. A maternal health voucher scheme: what have we learned from the demand-side financing scheme in Bangladesh? Health Policy Plan 2011; 26: 25-32. Available from: http://heapol.oxfordjournals.org/content/26/1/25.abstract

[3] Ensor T. Overcoming barriers to health service access: influencing the demand side. Health Policy Plan 2004;19: 69-79. Available from: http://www.heapol.oupjournals.org/cgi/doi/10.1093/heapol/czh009

[4] You D, Hug L, Ejdemyr S, et al. Global, regional, and national levels and trends in under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Inter-agency Group for Child Mortality Estimation. Lancet 2015; 386: 2275-2286. Available from: http://dx.doi.org/10.1016/S0140-6736(15)00120-8

[5] Bangladesh MOHFW. *Bangladesh Demographic and Health Survey 2014: Key Indicators*. Dhaka, Bangladesh: MOHFW 2015. Available from: https://www.k4health.org/sites/default/files/bdhs_2014.pdf (accessed 4/1/16).

[6] Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS. How many child deaths can we prevent this year? Lancet 2003; 362: 65-71.

[7] Bangladesh Bureau of Statistics. *Population and Housing Census 2011*. Government of Bangladesh 2011. Available from: http://203.112.218.66/WebTestApplication/userfiles/Image/BBS/Socio_Economic.pdf (accessed 4/1/16).

[8] Bangladesh MOHFW Local Health Bulletin, Chandina Upazilla Health Complex, 2014. Available from: http://app.dghs.gov.bd/localhealthbulletin2014/publish/publish.php?org=10000857&year=2014 (accessed 4/1/16).

[9] Bangladesh MOHFW Local Health Bulletin, Daudkandi Upazilla Health Complex, 2014. Available from: http://app.dghs.gov.bd/localhealthbulletin2014/publish/publish.php?org=10000875&year=2014 (accessed 4/1/16).

[10] WHO. Integrated Management of Childhood Illness (IMCI). Available from: http://www.who.int/maternal_child_adolescent/topics/child/imci/en/ (accessed 4/1/16).

[11] Bangladesh MOHFW, ARK Foundation, 2015. Integrated management of childhood illness (IMCI): age 2 months up to 5 years. Available from: http://comdis-hsd.leeds.ac.uk/wpcontent/uploads/2016/01/IMCI-English-version.pdf (accessed 6/1/16).

[12] Clopper CJ, Pearson ES. The use of confidence or fiducial limits illustrated in the case of the binomial. Biometrika 1934; 26: 404.

[13] Miller NP, Amouzou A, Tafesse M, Hazel E, Legesse H, Degefie T, Victora CG, Black RE, Bryce J. Integrated community case management of childhood illness in Ethiopia: implementation strength and quality of care. Am J Trop Med Hyg 2014; 91: 424-434. doi: 10.4269/ajtmh.13-0751

[14] Landsberger HA. *Hawthorne Revisited*. The New York State School of Industrial and Labor Relations, Ithaca, New York, 1958.

Table 1: Rapid assessment of quality of care of under-five children who attended 5 community clinics in Comilla district, Bangladesh, 2014-15

	Number seen per clinic per month	% who received proper diagnosis and care
Severely ill children		
Danger signs	3	50%
Pneumonia	9	20%
Diarrhoea	14	80%
Total severely ill children	26	56%
No treatment needed	37	10%
All children	63	29%

Table 2: Distribution of diseases among under-five children who attended the community clinics in two upazillas of Comilla district, Bangladesh, 2014-15

Disease	Number	(%)
Total	1490	(100)
No pneumonia (cold or cough)	991	(67)
Pneumonia	50	(3)
Severe pneumonia	2	(<1)
Diarrhoea	107	(7)
Dysentery	27	(2)
Fever not malaria	117	(8)
Very severe disease	1	(<1)
Mild viral Illness	26	(2)
Others*	169	(11)

*Others includes ear problems, cuts, burns, abdominal pain and skin problems

Table 3: Proportion of under-five children who received a correct diagnosis, treatment and referral in two upazillas of Comilla district, Bangladesh, 2014-15 (n=1490)

Outcome measures	Number	%	(95% CI)
Correct diagnosis decision	1355	91	(89-92)
Correct treatment decision	1277	86	(84-87)
Correct use of antibiotic	1326	89	(87-91)
Among those who required antibiotic (n=106)	94	89	(81-93)
Among those who did not require antibiotic (n=1384)	1232	89	(87-91)
Correct referral decision	1483	99.5	(99.0-99.8)
Among those who required referral (n=17)	16	94	(73-99)
Among those who did not require referral (n=1473)	1467	99.6	(99.1-99.8)

Table 4: Proportion of under-five children correctly diagnosed, treated (in relation to antibiotic use) and referred, by presenting disease, in two upazillas of Comilla district, Bangladesh, 2014-15

	Total	Correct* Diagnosis			Correct* antibiotic use			Correct* Referral		
Presenting disease		**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
No Pneumonia (cold or cough)	991	919	93	(91-94)	849	86	(83-88)	990	99	(99-100)
Pneumonia	50	34	68	(53-80)	44	88	(76-95)	50	100	(93-100)
Severe Pneumonia	2	1	50	(1-99)	2	100	(16-100)	2	100	(16-100)
Diarrhoea	107	105	98	(93-100)	105	98	(93-100)	106	99	(95-100)
Dysentery	27	27	100	(87-100)	26	96	(81-100)	27	100	(87-100)
Fever	117	104	89	(82-94)	112	96	(90-99)	117	100	(97-100)

*Correct means the CHCP's diagnosis was in accordance with the SACMO's subsequent re-diagnosis

Table 5: Assessment of consultation behaviours of community health care providers in two upazillas of Comilla district, Bangladesh, 2014-15 (n=37)

Consultation outcome measures	n	%	95% CI
Welcomed the patient	24	64	(47-80)
Encouraged patient to talk	37	100	(91-100)
Looked at the patient	37	100	(91-100)
Listened to the patient	37	100	(91-100)
Proper sitting arrangement during consultation	27	73	(56-86)
Look for danger signs of being severely ill	25	68	(50-82)
Asked about symptoms	37	100	(91-100)
Started questioning using open ended questions	37	100	(91-100)
Completed questioning using closed ended questions	35	95	(82-99)
Interrupted parent/carer while talking	18	49	(32-66)
Able to encourage parent/carer to describe the child's condition	37	100	(91-100)
Look, listen and feel for the relevant signs	36	97	(86-100)
Explain diagnosis and treatment to the patient	24	64	(47-80)
Give preventive messages related to this illness	26	70	(53-84)