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Short report

Which doctor for primary health care? Quality of care and non-physician clinicians in India

Krishna D. Rao [a,c,*], T. Sundararaman [b], Aarushi Bhatnagar [c], Garima Gupta [b], Puni Kokho [d], Kamlesh Jain [d]

[a] Public Health Foundation of India, ISID Campus, India
[b] National Health Systems Resource Center, Ministry of Health and Family Welfare, Government of India, India
[c] Department of International Health, Health Systems Program, Johns Hopkins University, USA
[d] State Health Resource Center, Government of Chhattisgarh, India

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ABSTRACT

The scarcity of rural physicians in India has resulted in non-physician clinicians (NPC) serving at Primary Health Centers (PHC). This study examines the clinical competence of NPCs and physicians serving at PHCs to treat a range of medical conditions. The study is set in Chhattisgarh state, where physicians (Medical Officers) and NPCs: Rural Medical Assistants (RMA), and Indian system of medicine physicians (AYUSH Medical Officers) serve at PHCs. Where no clinician is available, Paramedics (pharmacists and nurses) usually provide care. In 2009, PHCs in Chhattisgarh were stratified by type of clinical care provider present. From each stratum a representative sample of PHCs was randomly selected. Clinical vignettes were used to measure provider competency in managing diarrhea, pneumonia, malaria, TB, preeclampsia and diabetes. Prescriptions were analyzed. Overall, the quality of medical care was low. Medical Officers and RMAs had similar average competence scores. AYUSH Medical Officers and Paramedicals had significantly lower average scores compared to Medical Officers. Paramedicals had the lowest competence scores. While 61% of Medical Officer and RMA prescriptions were appropriate for treating the health condition, only 51% of the AYUSH Medical Officer and 33% of the prescriptions met this standard. RMAs are as competent as physicians in primary care settings. This supports the use of RMA-type clinicians for primary care in areas where posting Medical Officers is difficult. AYUSH Medical Officers are less competent and need further clinical training. Overall, the quality of medical care at PHCs needs improvement.

Introduction

In many areas of the world clinical care providers with shorter duration of medical training perform clinical functions normally expected of physicians. Non-physician clinicians (NPC) are now increasingly viewed as a cost effective means of delivering primary health services (Huicho, Scherpbier, Nkowane, & Victora, 2008; Kurti, Rudland, Wilkinson, Dewitt, & Zhang, 2011; Laurant et al., 2005; Lehmann, Van Damme, Barten, & Sanders, 2009; Mullan, 2007). Where physicians are scarce they offer a way to continue clinical services. In several countries, NPCs have become the main providers of primary care, and in some instances, even provide specialist services (Abegunde et al., 2007; McCord, 2009; Warriner et al., 2011; Wilson et al., 2011).

India has had an uneasy relationship with NPCs. At Independence in 1947 two kinds of allopathic clinicians were present – physicians who had at least five-and-a-half-years of training and Licentiate Medical Practitioners (LMP) who underwent three years training. Nearly two-thirds of the qualified medical practitioners were LMPs and they mostly served in rural areas (GOI, 1946). LMPs were abolished after Independence – India was to produce only one type of clinician, the MBBS graduate. However, the personal and professional expectations of MBBS graduates were not compatible with rural service. Their scarcity in rural India is testimony to this – in 2005, for every 10,000 people, there were around 10 qualified physicians in urban but only 1 in rural areas – a ten-fold difference (Rao, Bhatnagar, & Berman, 2012). Not surprisingly, unqualified practitioners have occupied the rural workforce

* Corresponding author. Public Health Foundation of India, ISID Campus, 4 Institutional Area, Vasant Kunj, New Delhi 110070, India. Tel.: +91 9818954463 (cell), +91 11 4956 6000x6009; fax: +91 11 4956 6063.
E-mail addresses: kd.rao@phfi.org, krao@jhsph.edu (K.D. Rao), sundararaman.t@gmail.com (T. Sundararaman), abhatnag@jhsph.edu (A. Bhatnagar), drguptagarima@gmail.com (G. Gupta), kpuni04@gmail.com (P. Kokho), kamleshjain@gmail.com (K. Jain).

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space: national surveys indicate that up to 63% of clinicians practicing in rural India have inadequate medical training (Rao et al., 2011, 2012).

One response to the rural physician deficit has been to deploy NPCs. Clinicians with three years of training in allopathic medicine currently operate Primary Health Centers (PHC) and sub-centers in the states of Chhattisgarh and Assam, respectively. In Chhattisgarh they are known as Rural Medical Assistants (RMA). The central health ministry recently proposed to extend such cadres nationwide through the Bachelors of Rural Health Care (BRHC) course (Kinra & Ben-Shlomo, 2010). Physicians trained in Indian systems of medicine (ayurveda, yoga, unani, siddha) and homeopathy, commonly known by the acronym AYUSH, serve at PHCs in many states of India. AYUSH Medical Officers are, following national policy, posted at PHCs to mainstream Indian systems of medicine and homeopathy. Often they serve as the primary clinical provider there because no Medical Officers are available (Basu, 2009). There has been much concern in India about NPCs with critics questioning their necessity and clinical ability (Garg, Singh, & Grover, 2011). A former health minister even labeled RMA type of clinicians as 'qualified quacks' (Ramadoos, 2010). Yet, this debate continues without any empirical evidence on the performance of NPCs in the Indian context.

This study aims to evaluate the clinical competence of physicians and NPCs serving at PHCs in India. We measure their knowledge of (i.e. how much they know) treating conditions commonly seen in primary care settings. Our study is set in the central Indian state of Chhattisgarh which has a population of 26 million, of which, 78% live in rural areas. In response to the shortage of rural physicians, the state government deployed the following types of clinicians at PHCs – physicians (Medical Officer), AYUSH physicians (AYUSH Medical Officer) and clinicians with three years allopathic training (RMA). At many PHCs, paramedicals (nurses and pharmacists) provide clinical services because no clinician is present. However, they are neither trained nor expected to perform this job. In this study the term physician refers to a medical doctor or a Medical Officer i.e. those with a graduate (MBBS degree) or higher degree in allopathic medicine. We use the term 'non-physician clinician' (NPC) to denote clinical care providers who have undergone shorter duration training (relative to physicians) in allopathic medicine. Here, RMAs and AYUSH physicians are considered NPCs.

Rural Medical Assistants (RMA) and AYUSH physicians

The state of Chhattisgarh started training of RMAs in 2001. RMAs experience three and a half years of training followed by a year of internship. In contrast, physicians possessing an MBBS undergo five-and-a-half-years of training including a year of internship. The RMA curriculum is essentially a compressed MBBS program (Raha, Bossert, & Vujicic, 2010). However, their internship prepares them for rural service; RMAs spend one month at a sub-center, three months at a PHC, four months at a sub-district hospital, and four months at a district hospital where they were rotated through different departments. They receive a Diploma in Modern and Holistic Medicine on completing their training. RMAs can serve only at PHCs and they perform all the clinical, public health and administrative duties expected of a Medical Officer (except for post-mortems and medico-legal cases).

AYUSH physicians in this study were ayurvedic physicians. They possessed a Bachelor of Ayurvedic Medicine & Surgery (BAMS) degree, which has the same duration as the MBBS degree. They receive some exposure to allopathic medicine during training, and when in government service, they are trained to manage conditions related to a range of national disease control programs like malaria and TB. Available evidence indicates that it is common for AYUSH physicians to engage in 'mixed practice' and prescribe allopathic medicines, though the legality of this is ambiguous (Kumar, 1997; Press Information Bureau, 2007; Verma, Sharma, Gupta, Gupta, & Kapoor, 2007).

Methods

Study design

The study uses a cross-sectional design in which PHCs in Chhattisgarh were first stratified by the primary clinical care provider (Medical Officer, AYUSH Medical Officer, RMA, Paramedicals) present. A random sample of PHCs was drawn from each stratum to select a representative sample. Exiting patients and surrounding households from selected PHCs were also sampled – Appendix A details the sampling plan and findings from the patient and household survey. Data for the study was collected between July and September 2009.

Selection of clinicians and PHCs: To get a representative sample of different types of clinical care providers serving at PHCs, a listing of PHCs and their staff was compiled based on information supplied by the Department of Health and Family Welfare, Chhattisgarh. This information was verified with district level managers. PHCs located in areas unsafe areas were excluded from the list. This final list constituted the sampling frame for PHCs.

The staffing pattern of PHCs allowed the 706 PHCs in Chhattisgarh to be classified into six groups according to the main clinical care provider present – Medical Officers regular (210) and contractual (123), AYUSH Medical Officer (169), RMAs (63), Paramedicals (53) and Others (88). The Others comprised of dressers, Auxiliary Nurse Midwifes and other support staff (Table 1). In the rare instance where there was more than one clinician present, typically Medical Officer and AYUSH Medical Officer, the PHC was assigned to the senior ranking clinician's (e.g. Medical Officer) group.

Simple random sampling was used to select a representative sample of 40 PHCs within each group. This sample size was calculated on the basis of the minimum number of PHCs required to detect a 15% difference in mean patient perceived quality scores between two groups with 90% power and a Type-1 error of 5%. Only PHCs in the regular Medical Officer, AYUSH Medical Officer, RMA, and Paramedical group were sampled. Contractual Medical Officers were excluded because they are similarly qualified as their regular counterparts. PHCs in the Others group were excluded because they do not provide clinical care. Clinical providers were interviewed after taking informed consent. They were asked to report for the interview by government order and received no prior information about the content or process of the interview.

Analytical methods

Clinical vignettes: Clinical vignettes were used to measure clinician knowledge in managing six standardized cases through a simulated consultation in which one of the interviewers acted as the patient (Das & Hammer, 2007; Leonard & Masatu, 2005; Peabody et al., 2004). Six standardized cases were presented – malaria in an adult woman, diarrhea with severe dehydration in an infant boy, pneumonia in a young girl, pregnancy induced hypertension, adult male with TB and an adult male with type II diabetes (see Appendix B for more details on vignette development, administration and questionnaires).

Each vignette consisted of six sections – history, examinations, diagnostics, diagnosis, prescription and home care recommendations. Items in each section were selected in a multi-stage process based on standard treatment guidelines, consultations with

Table 1
Sample characteristics.

	Medical Officer	RMA	AYUSH Medical Officer	Paramedical	All
Clinical care providers					
Male (%)	83	64	94	83	81
Age	42.3 (7.55)[a]	25.2 (1.76)	35.1 (5.15)	33.2 (11.28)	34.0 (9.33)
Served at PHC (months)	148.4 (88.99)	10.8 (1.74)	41.0 (21.34)	110.9 (130.47)	78.0 (95.46)
Practice allopathic medicine[b] (%)	100	100	100	100	100
N	35	39	37	35	146
PHC and village					
PHC infrastructure index	3.9 (2.35)	3.4 (2.53)	2.8 (1.94)	2.7 (2.27)	3.2 (2.31)
Drug stock outs (per year)	1.6 (2.88)	1.3 (1.52)	1.5 (2.53)	1.8 (2.80)	1.6 (2.45)
Tribal location (%)	26	33	74	26	40
Village development index	5.0 (1.09)	4.5 (1.31)	3.8 (1.73)	5.0 (1.09)	4.6 (1.42)
Distance from town (km)	21.2 (15.63)	19.0 (12.21)	27.1 (20.52)	27.4 (41.24)	23.6 (24.89)
N	35	39	37	35	146

[a] SD in parenthesis.
[b] Allopathic medicine practiced either exclusively or in combination with ayurvedic medicine.

primary care practitioners in Chhattisgarh and experts at Raipur Medical College and the All India Institute of Medical Sciences, Delhi. The vignettes were pre-tested on different types of primary care clinicians. Each vignette item had a standard response associated with it, which provided the important advantage of standardizing cases across clinicians.

Clinicians were asked to write prescriptions based on their diagnosis. These were evaluated against standard treatment guidelines and by a panel of specialists. Prescriptions were classified as 'appropriate' or 'inappropriate' for treating the health condition. No prescriptions were evaluated for the TB or preeclampsia case because national guidelines require referrals (see Appendix C for details on the prescription analysis methods).

The competence scores derived from the clinical vignettes measure how much providers know in managing the presented condition (Das & Hammer, 2005). Relevant items in the clinical vignettes received one point if the provider mentioned them during the simulated consultation. Similarly, 'appropriate' prescriptions received one point. Section scores were summed across cases and scaled so that the maximum attainable score was one hundred. Summary scores were standardized and expressed as standard deviations from the overall sample mean. Group differences were tested before and after controlling for individual (sex, age), PHC (infrastructure index, annual frequency of drug stock outs) and area (tribal area, village development index, distance from nearest town) characteristics. The PHC infrastructure index combines eight items that indicate the extent of the PHCs structure like the presence of a toilet, separate examination room, and laboratory. The village development index combines six items that indicate the presence of infrastructure such as the presence of schools, piped water, bus service and mobile connectivity.

Data was entered into a database created using CSPro (CSPro, 2009). Forms were double entered by independent operators. No personal identifiers were recorded. The frequency of missing observations was ignorable. STATA 10 (StataCorp, 2007) was used for analysis.

Ethical clearance for the study was received from the Public Health Foundation of India Institutional Review Committee and the WHO's Research Ethics Review Committee.

Results

Around 30% of the PHCs in Chhattisgarh had a Medical Officer present. The sample size achieved (target) was 146 (160) PHCs. In 91% of the target PHCs the selected clinical provider was available and the remaining PHCs lost to non-response.

PHCs headed by AYUSH Medical Officers (74%) were mostly in tribal areas (Table 1). PHCs in the AYUSH Medical Officer and Paramedical groups were more remotely located. Pharmacists comprised 83% of the Paramedical sample. The majority of sampled clinical providers were male, though this proportion was relatively lower for RMAs. On average, Medical Officers had served the longest and RMAs for the shortest duration at PHCs. This is consistent with the RMAs being recent graduates and recruits to government service. Across groups, household members had similar sex and age distributions. The majority of household members reported being able to read, though this proportion was lower for the AYUSH Medical Officer group and a reflection of the largely tribal population present there.

Competence scores in all cases had a wide range for every type of clinician (Fig. 1). All clinicians performed their best (i.e. highest median competence) in the malaria and TB case and their worst in the pneumonia and preeclampsia case. In every case, Medical Officers or RMAs had the highest median scores followed by AYUSH Medical Officers and then Paramedicals. Median scores of Medical Officers and RMAs were similar in all cases. Paramedics had the lowest median scores in all cases. Overall, Medical Officers and RMAs had the highest median competence, followed by AYUSH Medical Officers and Paramedicals.

The proportion of relevant history and examination items correctly identified by respondents was low for every clinician group (Table 2). However, the majority in each group identified the

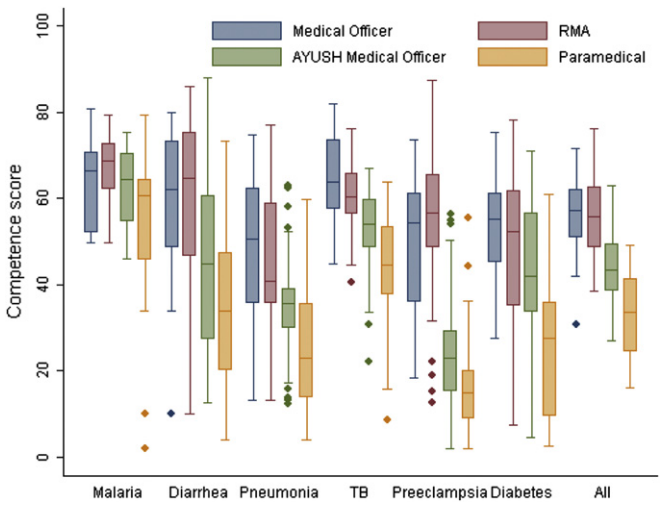

Fig. 1. Provider competence score by case.

Table 2
Proportion of correct responses in clinical vignette domains and overall competence.

Domain	Medical Officer	RMA	AYUSH Medical Officer	Paramedical
History	44% (2170)[a]	43% (2418)	32% (2294)	25% (2170)
Examinations	42% (1365)	40% (1521)	29% (1443)	21% (1365)
Investigation	81% (105)	80% (117)	75% (111)	61% (105)
Diagnosis	86% (210)	86% (234)	66% (222)	54% (210)
Prescriptions (appropriate)	61% (140)	61% (156)	51% (148)	33% (140)
Home care	37% (1155)	37% (1287)	31% (1221)	26% (1155)
Standardized competence score (95% CI)	0.69 (0.47, 0.91)	0.64 (0.41, 0.86)	−0.31 (−0.52, 0.09)	−1.08 (−1.33, −0.83)
Adjusted mean difference in competence scores[b] (95% CI)	Reference	0.08 (−0.37, 0.53)	−1.03 (−1.40, −0.67)	−1.61 (−1.99, −1.23)
N	35	39	37	35

[a] Figures are % (# relevant items) or mean (95% CI).
[b] Multiple regression analysis used to control for individual (age, sex), PHC (PHC infrastructure index, annual frequency of drug stockout) and area (village development index, distance from nearest town) characteristics.

correct diagnostic tests and case diagnosis. The proportion of 'appropriate' prescriptions was low across groups and the best performing group achieved only 61% appropriate prescriptions. The proportion of relevant home care items identified was low across groups.

In every area of competence, Medical Officers and RMAs have the highest proportion of correct responses, followed by AYUSH Medical Officers (Table 2). In every area Paramedicals do the worst. While 61% of Medical Officer and RMA prescriptions were appropriate, remarkably, only 51% of the AYUSH Medical Officer and 33% of the prescriptions met this standard.

Overall, Medical Officers and RMAs have similar average standardized competence scores, followed by AYUSH Medical Officers and Paramedicals (Table 2). Average competence scores for Medical Officers was 0.69 (95% CI 0.47–0.91) and for RMAs was 0.64 (95% CI 0.41–0.86) standard deviations above the sample mean. Average scores for AYUSH Medical Officers were −0.31 (95% CI −0.52 to 0.09) and for Paramedicals −1.08 (95%CI −1.33 to −0.83) standard deviations below the sample mean. After adjusting for other factors, there were no statistically significant difference in the adjusted average standardized competence scores between Medical Officers and RMAs. However, average scores of AYUSH Medical Officers and Paramedicals were significantly lower than Medical Officers.

Discussion

In many countries, particularly in areas where physicians are scarce, clinicians with shorter duration of medical training deliver basic clinical services. This study presents evidence on the clinical competence of NPCs and physicians at PHCs in India. It is the first study to specifically evaluate how well NPCs in India can manage conditions commonly seen in primary care settings. Since the study measures competence across a range of primary care providers it also provides an assessment of the quality of primary care produced. Available global evidence on NPC performance suggests that NPCs perform several clinical functions as well as physicians (Huicho et al., 2008; Laurant et al., 2005; McCord, 2009; Mdege, Chindove, & Ali, 2012). Little is known about NPC performance in India. One study, based in the city of Delhi, reported that physicians (in government or private service) were more competent than private AYUSH physicians, and unqualified providers were the least competent (Das & Hammer, 2007). Another study found that nurses were as capable as physicians in conducting surgical abortions (Jejeebhoy et al., 2011).

This study finds that Medical Officers and RMAs were equally competent in managing conditions commonly seen in primary care settings: malaria, diarrhea, pneumonia, TB, preeclampsia and diabetes. These conditions covered infectious, chronic and maternal health conditions and for a range of patient types – infants, children and adult men and women. Further, about 61% of their prescriptions were appropriate for treating the presented condition. The similar levels of clinical competence observed for Medical Officers and RMAs is consistent with evidence from other countries (Huicho et al., 2008; McCord, 2009; Warriner et al., 2011; Wilson et al., 2011).

AYUSH Medical Officers were less competent compared to Medical Officers and RMAs. This was consistently observed for all the six health conditions and across the vignette domains. Further, only half of their prescriptions were appropriate for treating the presented condition. These findings are consistent with earlier studies (Das & Hammer, 2007). The lower competence of AYUSH Medical Officers raises concern over their practice of allopathic medicine in primary care settings. While further training can improve their competence, AYUSH Medical Officers do offer an improvement over having no qualified clinician present (i.e. Paramedical case).

Paramedicals (mostly pharmacists in the study sample) were the least competent of the clinical care providers surveyed. They lack formal clinical training nor are they meant to perform this function. Yet, they treat patients because no one else is present. In this, they are harmful – only 33% of their prescriptions were appropriate for treating the presented condition. This highlights the harm that patients are exposed to when no trained clinician is present.

Overall, the quality of care at PHCs in Chhattisgarh state was poor irrespective of who provided clinical services. Alarmingly, even after decades of emphasis, qualified clinicians find it difficult to correctly diagnose and treat conditions like diarrhea, pneumonia and preeclampsia. Both diarrhea and pneumonia are well known child killers in India and account for a substantial portion of morbidity and deaths in children (Vishwanathan & Rohde, 1990). The competence levels of PHC clinicians in managing these conditions are remarkable because it indicates how poorly equipped frontline health workers are in dealing with such common and important problems.

The choice of using clinical vignettes to measure competence involved presenting the same set of standardized cases to the sampled providers. This offered the important advantage of evaluating providers on the basis of the same case-mix irrespective of provider type or their location. While clinical vignettes measure

knowledge, what providers do in practice, can differ from how much they know (Das & Hammer, 2007; Leonard & Masatu, 2005). However, if people can do as much as they know, then, the competence scores are the upper bound of what is achievable in practice. Another issue is that the sample of Medical Officers in our study likely represents physicians from the lower end of the competency distribution of the physician population. Rural posts hold little attraction for most physicians and those with limited prospects elsewhere tend to end up in these jobs. An implication of this is that RMAs are no better than poor performing Medical Officers. While this underscores the need for improving the quality of rural clinicians, the difficulty of recruiting even poorly performing Medical Officers to rural posts highlights the utility of RMA-type clinicians – of placing someone equivalent to a Medical Officer and who is more likely to live and serve there. Indeed, at the time of this study, only 30% of Chhattisgarh's PHCs had a Medical Officer and in 31% of the PHCs, mostly located in remote and tribal areas, the presence of either RMAs or AYUSH Medical Officers enabled clinical services to continue. The alternative of not having any clinician present at a health center, as seen in the Paramedical case, clearly exposes patients to harm. NPCs, particularly clinicians like RMAs, offer a substantial improvement over this situation.

India's plans for making health care universal needs to address the challenge of attracting and retaining qualified clinicians in rural areas. Indeed, it is not uncommon to find health centers with missing physicians scattered across the Indian countryside. NPCs – whether they are clinicians with three years training, nurse-practitioners or better trained AYUSH physicians – can play an important role in bringing basic health services to all.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.socscimed.2013.02.018.

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