### Tuberculosis control needs a complete and patient-centric solution





Whether it is mobile phone service or vacation travel, good businesses know that success depends on providing a complete and customer-centric solution. Should patients with tuberculosis not be offered a complete solution that is patient-centred? After all, millions are affected<sup>1</sup> and a large market at the base-of-the-pyramid remains unserved.

A complete and patient-centric solution will not only include care that meets the International Standards for Tuberculosis Care,<sup>2</sup> but also be delivered with dignity and compassion, grounded in the reality of patients' lives as they navigate the long pathway from symptoms to cure. Such solution-based innovation requires a systems-thinking approach that must place patients at the centre of design strategies, recognise their clinical and psychosocial needs, and be cost-effective.

Are tuberculosis patients in high-burden countries currently getting such a patient-centric solution? Let us consider India, which accounts for quarter of all tuberculosis cases in the world.1 Whether patients in India seek care in the public or the private sector, they struggle to get a complete solution. Although the Revised National Tuberculosis Control Programme (RNTCP) has done well to reach scale and provide free diagnosis and treatment for patients with drugsensitive disease in the public sector, the programme falls short in making sure that all patients get screened for drug resistance and in ensuring adequate therapy for all patients with multidrug-resistant (MDR-TB) and extensively drug-resistant tuberculosis. Of the estimated 64 000 cases of MDR-TB in 2012, only 17 373 cases were diagnosed under the RNTCP.1

The diagnostic infrastructure in the public sector relies mainly on sputum smear microscopy that cannot detect drug resistance. It is only when patients fail to get better on standard treatment, or have recurrence of tuberculosis, that they get screened for MDR-TB, resulting in morbidity, continued transmission, and movement of patients from the public to the private sector. Recognising these problems, the RNTCP is actively scaling up capacity to diagnose and treat MDR-TB.<sup>3</sup> If adequately funded and successful, these initiatives should improve patient experience in the public sector.

But the stark reality of tuberculosis in India is that 50% of all cases are managed in the private sector,<sup>4</sup> where the quality of tuberculosis care is suboptimal with inaccurate diagnosis,<sup>5</sup> non-standard drug prescriptions,<sup>6</sup> and limited effort to ensure treatment adherence.<sup>7</sup> Also, private practitioners often do not screen for drug resistance and empirical antibiotic abuse is rampant.<sup>8</sup> All this means that drug resistance can emerge or worsen, with poor outcomes.<sup>8</sup> Lastly, out-of-pocket expenditure in the private sector can be catastrophic.<sup>9</sup>

Are there examples of initiatives that address the above systemic problems? Operation ASHA is a nongovernmental organisation that extends the RNTCP model, and uses public sector diagnostics and drugs to orchestrate a solution by establishing community-based treatment centres and ensuring adherence using local community providers and partners. 10 It also leverages biometrics to increase efficiency and effectiveness. It relies on donors and the public sector for funding. This social enterprise model, however, does not offer a solution to patients who seek care in the private sector. World Health Partners is a donor-supported social marketing and social franchising model that delivers affordable reproductive and primary care (including tuberculosis) in underserved rural areas, by leveraging local entrepreneurs and informal providers and by connecting them to the formal

Published Online March 24, 2014 http://dx.doi.org/10.1016/ S2214-109X(14)70198-6

For **Operation ASHA** see http://www.opasha.org/

For **World Health Partners** see http://worldhealthpartners.org/



Figure: A patient with drug-resistant tuberculosis in India

For **IPAQT** see http://www.ipaqt.org/

sector and specialists via telemedicine.<sup>11</sup> The Initiative for Promoting Affordable, Quality TB tests (IPAQT), a coalition of more than 60 private laboratories, supported by non-profits such as the Clinton Health Access Initiative, has increased the availability and affordability of WHO-endorsed tuberculosis tests.<sup>12</sup> Although IPAQT is addressing the problem of suboptimal diagnosis, it does not cover treatment.

RNTCP recently announced "universal access to quality diagnosis and treatment for all tuberculosis patients in the community" as its goal in the new National Strategic Plan.<sup>3</sup> Recognising the need to leverage the private sector in developing a solution, the plan includes engagement of the private sector using "public private interface agencies" to enlist, sensitise, incentivise, and monitor diagnosis and treatment by private providers, to provide patients' cost offsets such as subsidised diagnostics and free drugs to privately treated patients, and improve case notifications to the RNTCP. Ongoing pilot projects in Mumbai and Patna should inform policies for refinements and scale-up of this model.

Outside of India, Operation ASHA is now replicating its model in Cambodia. In Bangladesh, BRAC's tuberculosis programme with *shasthya shebikas* has been successful in the public sector.<sup>13</sup> This model is now creating linkages with private providers. Additionally, they have created partnerships with garment industry owners in export processing zones that provide factory workers with better access to tuberculosis diagnosis and treatment using BRAC's infrastructure.

With donor support, Interactive Research and Development and partners are expanding access to Xpert MTB/RIF (Cepheid Inc, CA, USA), a WHO-endorsed test, in the private sector in Dhaka, Jakarta, and Karachi, through mass verbal screening in private clinic waiting rooms, and referrals for computer-aided digital X-ray diagnosis. <sup>14</sup> This model includes management of comorbid conditions such as diabetes and chronic obstructive pulmonary disease, to generate revenue for this social enterprise.

All these models are promising, but the goal of a complete, patient-centric solution is still elusive. Continued innovation in the development of scalable, sustainable, and replicable business models to provide such solutions is crucial. To improve accessibility and affordability, many of the models will depend on community workers and coordinators, underscoring the need for well designed strategies for their recruitment,

training, incentivisation, and performance management. Information and communications technologies will also be crucial for success.

Solution-centric approaches have shown promise in several other base-of-the-pyramid contexts, from affordable eye care to artificial limbs. <sup>15</sup> By using product and process innovations, often with community champions, these models have shown that it is possible to serve base-of-the-pyramid market needs effectively and efficiently and with compassion and dignity. Individuals with tuberculosis deserve nothing less.

\*Madhukar Pai, Prashant Yadav, Ravi Anupindi McGill International TB Centre and Department of Epidemiology & Biostatistics, McGill University, Montreal, Quebec H3A 1A2, Canada (MP); and Stephen M Ross School of Business (PY, RA) and School of Public Health (PY), University of Michigan, Ann Arbor, MI, USA madhukar.pai@mcqill.ca

MP serves on the editorial board of *The Lancet Infectious Diseases*. He serves as a consultant to the Bill & Melinda Gates Foundation (which did not fund or sponsor this work). We declare that we have no competing interests.

Copyright  $\odot$  Pai et al. Open Access article distributed under the terms of CC BY.

- 1 WHO. Global tuberculosis control: WHO report 2013. Geneva: World Health Organization, 2013.
- 2 TB CARE I. International standards for tuberculosis care, 3rd edn. The Hague: TB CARE I, 2014. http://istcweb.org/ (accessed March 10, 2014).
- 3 Sachdeva KS, Kumar A, Dewan P, Kumar A, Satyanarayana S. New vision for Revised National Tuberculosis Control Programme (RNTCP): universal access—"reaching the un-reached". Ind J Med Res 2012; 135: 690-94.
- 4 Hazarika I. Role of private sector in providing tuberculosis care: evidence from a population-based survey in India. J Glob Infect Dis 2011; 3: 19–24.
- 5 Jarosawlski S, Pai M. Why are inaccurate tuberculosis serological tests widely used in the Indian private healthcare sector? A root-cause analysis. J Epidemiol Glob Health 2012; 2: 39–50.
- 6 Udwadia ZF, Pinto LM, Uplekar MW. Tuberculosis management by private practitioners in Mumbai, India: has anything changed in two decades? PLoS One 2010; 5: e12023.
- 7 Achanta S, Jaju J, Kumar A, et al. Tuberculosis management practices by Private Practitioners in Andhra Pradesh, India. PLoS One 2013; 13: e71119.
- Udwadia ZF. MDR, XDR, TDR tuberculosis: ominous progression. Thorax 2012; 67: 286–88.
- 9 Tanimura T, Jaramillo E, Weil D, Raviglione M, Lonnroth K. Financial burden for tuberculosis patients in low- and middle-income countries: a systematic review. Eur Respir J 2014; published online Feb 20. http://dx. doi.org/10.1183/09031936.00193413.
- 10 Anupindi R. Operation ASHA: effective, efficient, and scalable model for tuberculosis treatment. Ann Arbour: University of Michigan, William Davidson Institute/GlobaLens Publishing. http://globalens.com/casedetail. aspx?cid=1429339 (accessed March 11, 2014).
- 11 Knowledge@Wharton. World Health Partners: leveraging entrepreneurship for health care delivery. http://knowledge.wharton.upenn.edu/article/ world-health-partners-leveraging-entrepreneurship-health-care-delivery/# (accessed Feb 28. 2014).
- 12 Pai M. Promoting affordable and quality tuberculosis testing in India. JLab Phys 2013; 5: 1-4.
- 13 BRAC Health Program. Making tuberculosis history: community-based solutions for millions. Dhaka: University Press, 2011.
- 14 Khan AJ. Social enterprise models for lung health and diabetes screening and management in 3 Asian megacities. http://www.who.int/tb/ careproviders/ppm/Aamir\_Khan.pdf (accessed Feb 27, 2014).
  - 5 Prahalad CK. The fortune at the bottom of the pyramid, 5th anniversary edition. Upper Saddle River: Pearson Prentice Hall, 2009.

For the BRAC tuberculosis programme see http://health.brac.net/tuberculosis-control-programme

For Interactive Research and Development see http://irdresearch.org/

## The need to further augment the public health system to control tuberculosis

completely agree with Madhukar Pai and colleagues<sup>1</sup> that a complete and patient-centric solution to tuberculosis control should be delivered with dignity and compassion. India's Revised National Tuberculosis Control Programme (RNTCP), which was recognised as one of the best-run tuberculosis control programmes in the world, has only been able to provide 27% of patients with multidrugresistant tuberculosis with treatment, which is worrisome. Pai and colleagues vouch for patient-centric solutions for complete treatment. However, they do not emphasise the fact that most of India's population is served by the public health system, with varied quality of services delivered. The scope for the tuberculosis control programme has been increasing from 2006 when the whole country was immunised, and there was a drive to strengthen the programme in the areas of tuberculosis and HIV co-endemicity, drug-resistant tuberculosis, tuberculosis-diabetes, and tuberculosis notification, without any major modification to the available human resources. The degree of integration expected from the general health system by the RNTCP was not fully achieved: the onus of treatment of a patient with tuberculosis always remained with the RNTCP, rather than the health system. We urge that the public health system in the country is augmented with new workforce strategies and policies to retain human resources and deliver appropriate care to the community. The proportion of gross domestic product spent on health is a meagre 4.1% in India, whereas developed countries, such as the USA, spend more than 17.1% on health care.2

The private health sector in India is uncontrolled. Strategies and models implemented in a particular place might not be easily replicable in other places. Engagement with the private sector is only a small part of how best to improve health care; strengthening of the public health sector is vital in India.

In conclusion, a complete and patientcentric solution can be provided by augmentation of the RNTCP, in terms of good governance of the health system, new technologies, increased investment in the general health system, and political and administrative will to implement high-quality services for tuberculosis care. For delivery of services under the national health programme in a vast country such as India, no replacement for the public health system exists.

We declare no competing interests.

Copyright © Nagaraja et al. Open Access article distributed under the terms of CC BY.

### \*Sharath Burugina Nagaraja, Ritesh G Menezes sharathbn@yahoo.com

Department of Community Medicine, Employees State Insurance Corporation Medical College and Post Graduate Institute of Medical Sciences and Research, Bangalore, India (SBN); and College of Medicine, King Fahd Hospital of the University, University of Dammam, Dammam, Saudi Arabia (RGM)

- 1 Pai M, Yadav P, Anupindi R. Tuberculosis control needs a complete and patient-centric solution. Lancet Glob Health 2014; 2: e189–90.
- World Bank. Health expenditure, total (% of GDP). 2014. http://data.worldbank.org/ indicator/SH.XPD.TOTL.ZS (accessed March 30, 2014).



# The need to furtheraugment the public health system to control tuberculosis

#### **Authors' reply**

We appreciate the response by Sharath Nagaraja and Ritesh Menezes to our Comment,1 in which we had argued that patients with tuberculosis deserve a complete and patientcentric solution, irrespective of whether they seek care in the public or private health sector. Nagaraja and Menezes seem to have missed this key point and instead reframe the argument as public sector strengthening versus private sector engagement. They also make the erroneous claim that most of India's population is served by the public health system, when data suggest the converse.2

We should rise above this anachronistic public versus private care debate and focus on the orchestration of a solution for all patients with tuberculosis, making use of the best and most efficient mix for a specific context. Patients might not care who exactly is orchestrating the solution, where funds or drugs are sourced from, or which players are engaged, so long as they get quality care that is accessible and affordable.

We do agree with Nagaraja and Menezes that the Revised National TB Control Programme (RNTCP) needs to be further strengthened and overall governmental expenditure on health must increase.<sup>3</sup> Indeed, if

the Indian government were to fully fund the RNTCP to implement the National Strategic Plan, universal access could become a reality, not merely an aspirational goal.<sup>3</sup> RNTCP might also assume a stewardship role across public and private sectors and enable patient-centric solutions.

However, we do not think tuberculosis can be controlled by strengthening of the public system alone because millions of people seek initial care for their symptoms from hundreds of thousands of chemists, informal providers, practitioners of alternative health systems, and qualified private doctors.4 These providers outnumber the public sector workforce by a huge margin and seem to be preferred by most patients.2 Because early diagnosis is crucial for reduction of transmission, engagement of these first-contact providers is important. Other good reasons to engage the private sector, including improvement of the quality of tuberculosis care in line with Standards for Tuberculosis Care in India (STCI); improvement of case notifications; and establishment of linkages for private providers to refer patients to the RNTCP, exist.5

Even with greater resources, limitations restrict what the public sector can do, and we cannot wish the private sector away. But more importantly, no good reason exists to assume that the government needs to play a part in the finance of health care and its delivery. Indeed, the government's financing and regulation of health care might sometimes be

more efficient and cost-effective than its provision of a service. Indeed, use of the private sector for public good widens the nature and scope of the public-private mix. Thus, engagement of all providers is a core element of the post-2015 Global Tuberculosis Strategy.

MP serves on the editorial board of *The Lancet Infectious Diseases*. He serves as a consultant to the Bill and Melinda Gates Foundation (which did not fund or sponsor this work). PY and RA declare no competing interests.

Copyright © Pai et al. Open Access article distributed under the terms of CC BY.

### \*Madhukar Pai, Prashant Yadav, Ravi Anupindi madhukar.pai@mcgill.ca

McGill International TB Centre and Department of Epidemiology & Biostatistics, McGill University, Montreal, Quebec, Canada (MP); and William Davidson Institute, Stephen M Ross School of Business, and School of Public Health, University of Michigan, Ann Arbor, MI, USA (PY, RA)

- Pai M, Yadav P, Anupindi R. Tuberculosis control needs a complete and patient-centric solution. Lancet Glob Health 2014; 2: e189–90.
- 2 The MAQARI team. Mapping medical providers in rural India: four key trends. http://www. cprindia.org/sites/default/files/policy%20brief\_1. pdf. Delhi: Centre for Policy Research, 2011.
- Laxminarayan R, Nandi A. Tuberculosis control in India: More bang for bucks than simply saving lives. http://ideasforindia.in/article. aspx?article\_id=147. New Delhi: International Growth Centre, 2013.
- 4 Kapoor SK, Raman AV, Sachdeva KS, Satyanarayana S. How did the TB patients reach DOTS services in Delhi? A study of patient treatment seeking behavior. PLoS One 2012; 7: e42458.
- 5 Ratnavelu VK, Pai M. TB control: five key reasons to engage the private sector. http:// www.thehindu.com/sci-tech/health/medicineand-research/tb-control-five-key-reasons-toengage-the-private-sector/article5805559.ece (accessed March 19, 2014).
- 6 Preker AS, Liu X, Velenyi EV, Baris E. Public ends, private means: strategic purchasing of health services. Washington: World Bank, 2007.



For more on the post-2015 Global Tuberculosis Strategy see http://www.who.int/tb/ post2015\_TBstrategy.pdf?ua=1

For more on **Standards for Tuberculosis Care in India (STCI)** see http://www.tbcindia.nic.in/pdfs/STCI%20Book\_
Final%20%20060514.pdf