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Study of Emergency Response Service - EMRI model



National Health Systems Resource Centre
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Study of Emergency Response Service - EMRI model

The study on Emergency Response Services, with specific reference to the EMRI model in states like Andhra Pradesh and Gujarat, had been commissioned under the National Rural Health Mission (NRHM), Ministry of Health & Family Welfare, Government of India, in November 2008, at the request of Shri G.C. Chaturvedi (Additional Secretary and Mission Director).

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The views expressed in paper are that of the authors and does not in any way reflect the opinion of the Ministry of Health and Family Welfare, Government of India.

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Abbreviations

ALS	Advance Life Support
AP	Andhra Pradesh
APL	Above Poverty Line
BLS	Basic Life Support
BOT	Build Operate Transfer
BPL	Below Poverty Line
Capex	Capital expenditure
CEO	Chief Executive Officer
EMRI	Emergency Management and Research Institute
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
ERS	Emergency Response Service
FW	Family Welfare
GDP	Gross Domestic Product
GIS	Geographic Information System
GoAP	Government of Andhra Pradesh
GoG	Government of Gujarat
Gol	Government of India
GoR	Government of Rajasthan
Govt.	Government
HMRI	Health Management and Research Institute
HR	Human Resources
ICU	Intensive Care Unit
IHS	Institute of Health Sciences
IIT	Indian Institute of Technology
IIHMR	Indian Institute of Health Management and Research
IPHS	Indian Public Health Standard
IRM	Internal Review Meeting
JSY	Janani Suraksha Yojana
MoHFW	Ministry of Health & Family Welfare
MOU	Memorandum of Understanding
NGO	Non-Government Organisation
NHSRC	National Health Systems Resource Centre
NRHM	National Rural Health Mission
Opex	Operating expenditure
PHC	Primary Health Centre
PIP	Programme Implementation Plan (annual state plans under NRHM)

PPP	Public Private Partnership
PSAP	Public Safety Answering Point
RFP	Request for Proposals
RSBY	Rashtriya Swasthya Bima Yojana
RTA	Road Traffic Accident
SHRC	State Health Resource Centre
SPMU	State Programme Management Unit (under NRHM)
UK	United Kingdom
USA	United States of America

Report of the 1st Phase of the Study

STUDY OF EMERGENCY RESPONSE SERVICE (EMRI MODEL) IN SELECTED STATES IN INDIA

I. Emergency Response Service (ERS): An Introduction

Emergency Response Service (ERS) is generally associated with medical services, police emergency and fire service. This forms the core group of services to be provided. However, many other functions can be combined to form a broader 'package' of ERS including emergencies like mountain rescue, cave rescue, mine rescue etc. Other emergencies like disaster relief and famine relief form part of the civil emergency services.

Historically, Emergency Response Services (ERS) are in practice since 18th century (during the Napoleonic times) when a pre-hospital system was designed to triage and transport the injured from the field to aid stations. An emergency *call* service was first launched in 1937 in the UK known as the *999 emergency services*. The key lesson, as evident from the experiences of such ERS worldwide and historically, is that these are not short run investments. Even after 70 years of operation, 999 required an investment of £10 million (GBP) on infrastructure and training. This provides six kinds of services: police, ambulance, fire, coastguard, cave and mountain rescue. The European counterpart to this service is the 112 number that also runs in the UK today along with its 999 phone line. The United States of America (USA) introduced similar service with the number 911 in 1968. It has been designated as the *Universal Emergency Number* for citizens throughout the US to request for emergency assistance. Today, approximately 96% of continental USA is covered by 911. It is intended as a nationwide telephone number and gives the public fast and easy access to a Public Safety Answering Point (PSAP).

In the Indian context, a much discussed and successful PPP model for ERS is the *108 Emergency Service* being managed and operationalised by EMRI (Emergency Management and Research Institute) in many states in India like Andhra Pradesh, Gujarat, Uttarakhand, and Rajasthan with around 1300 ambulances running currently (as on December 2008)¹. EMRI was set up as a registered society with 17 members and most of them were family members of Mr. Ramalinga Raju, the then CEO of Satyam Technologies. Initial funds came from the personal funds of Shri Raju with Satyam Technologies providing technical support. With the expansion of fleet and services set to spread across more states, EMRI projected reaching a goal of 10,000

¹ As of March 2009 the number of ambulances has increased to 1735 (Annexure: A-22)

ambulances covering over a billion population by 2010. The EMRI aims to build an ERS wherein the ambulance reaches the patients/sites within 15-20 minutes and that the patient is shifted to the nearest hospital within 20 minutes thereafter. EMRI operations in some of the states in India are listed in table 1 below.

Table 1: EMRI in various states of India

State	Launching Date	Status
Andhra Pradesh	April 2, 2005	652 ambulances covering the entire state with 100% population coverage
Gujarat	August 29, 2007	402 ambulances throughout the state with 100% population coverage
Uttarakhand	May 15, 2008	90 ambulances covering entire state with 100% population coverage
Tamil Nadu	September 15, 2008	172 ambulances covering 18 of 32 districts , and 62% of the population
Rajasthan	September 20, 2008	100 ambulances covering all 33 districts but only 21% of the population- largely urban
Goa	September 5, 2008	18 ambulances covering 100% of the state
Karnataka	November 1 st 2008	150 ambulances covering 17 of 29 districts and 72% of the population
Assam	November 6 th 2008	83 ambulances covering 12 of 28 districts and 50% of the population
Meghalaya	February 2 nd , 2009	15 ambulances covering 2 of 7 districts and 41% of the population.

Source: EMRI Documents - Annexure A-16: National Performance Report , dated Feb 17th 2009,

Presently nine states have already signed the MOU with EMRI for running the ERS in their states and there are other states who are considering the same. The value of the MOU also differs between the states, with Rajasthan having an MOU of Rs. 50 crores per year representing both capex and opex, AP has 114 crores a year representing only opex costs and Gujarat has 252 crores over 5 years (accounting for both capex and opex) . As per the projections of EMRI, they are expecting an annual MOU value of around Rs. 1500 crores per year from 2010 onwards.

II. Context of the EMRI Appraisal Study

With the emerging significance of the EMRI model as a preferred option for providing ERS across most of the states in India, and its increasing support under the NRHM, the Ministry of Health & Family Welfare, Govt. of India, in November 2009, commissioned a review of EMRI scheme in selected states of Andhra Pradesh, Gujarat and Rajasthan, through the NHSRC.

This appraisal would help the Ministry of Health & FW, Govt. of India, in suggesting replication and improvement of the programme, and also help build systemic linkages so as to maximise health outcomes from this scheme.

To study the experience with EMRI this appraisal decided to focus on three of the nine states- Andhra Pradesh, Gujarat and Rajasthan. The reasons for this choice are given below:

The EMRI managed ERS in Andhra Pradesh has become a bench-mark for ERS in India and various other states are in the process of adopting the EMRI model. This necessitates a review of the original EMRI model of Andhra Pradesh to draw lessons for designing ERS in other states in India. Similarly, Gujarat, which has already implemented various successful PPP models in the health sector, has implemented ERS through EMRI in a big way. This also necessitates looking at the EMRI experience in Gujarat, as unlike AP, Gujarat is a green-field project for EMRI as it did not have any pre-existing fleet of ambulances and the whole EMRI project is almost completely supported by the Govt. of Gujarat financially (with support from the Govt. of India, under NRHM). Rajasthan has also launched the EMRI model in the year 2008 and has adopted the process followed by Gujarat, including a similar business model and MOU. So, Rajasthan was also included in the appraisal of EMRI models in the country to get an understanding of the situation in the first year.

While assessing the EMRI model, this review has to address many of the issues that states grapple with. One such issue is related to the number of ambulances required to provide an emergency response of quality and another is the estimated case load each of these ambulances would have to deal with. These two issues have major cost implications. Also it is important to assess is the unit cost of this service – “per ambulance trip” and “per ambulance per year”. One would also have to estimate these unit costs for different volumes of utilisation and distances and years of functioning. We may estimate that if EMRI were adopted by all the states in India with an ambulance density of one ambulance per lakh population (which is recommended by EMRI), we would need around 10,000 ambulances to cover the country. The cost for this would be Rs. 1700 crores annually (current costs are approximately Rs. 17 lakhs per ambulance per year, taking both the operational as well as the annualised capital costs). Since this represents around 10% of current NRHM allocations, the government would need to satisfy itself that the deliverables are being achieved in the most cost-effective way possible and the service provider is also accountable for its performance. As government expenditure on NRHM is projected to reach Rs. 55,000 Crores per year by 2012, the ERS cost discussed earlier represents only 3% of it, and this by itself cannot be considered too high a cost for guaranteeing comprehensive ERS to all the people of this country. However this is based on current utilisation patterns and density of ambulances deployed. If rising demand changes the current ground rules, and if the provision within 20 minutes is insisted upon everywhere, the costs could go up exponentially. There are also possibilities for making the system more

efficient², and also estimating the break-even point beyond which rising utilisation will not further lower operational costs, even at optimal efficiency.

On the service provision side of the ERS, the tie ups with hospitals are also very important in this whole scheme as there has to be a linkage with a hospital that will be willing to provide hospitalisation care to the poor. The investment and expenditure in transporting the patients to the hospitals (free, without charging any fees for transportation) should be proportionate to the cost of providing the clinical management in the health facility (cost of treatment and the proportion of this, which is free). There are regulatory issues too regarding looking at ERS as a specialised sub-branch within healthcare and the subsequent accreditation of emergency paramedical staff.

The larger issue is that if ERS becomes an entitlement under the proposed National Health Bill, as indeed it should become, then regulation would have a further positive content. That is the role of the state in guaranteeing universal access to such a service. In this context, both the financing of this scheme for different levels of utilisation and the mechanisms of governance and accountability become much more urgent

The appraisal of the EMRI scheme was therefore proposed and initiated in this context. Within a few weeks of constituting and beginning our work and barely a few days of the first formal interview with the EMRI, the crisis occurred in Satyam which involved its owner and chief sponsor of EMRI. Though this had few direct implications on the study, the problems of liquidity that EMRI encountered required states to make more advances, and for this purpose they were keen to know the findings of this study. Also the states on the verge of entering into contracts also started awaiting these findings. One immediate implication of this was that the study initially planned as a six month work was now converted into a two phase study- one based on review of documents and interviews leading to a first phase overview report to be followed by a sample study and validation of data and a final report. Though this first phase covers almost all aspects of the scheme, it is limited by the fact that it is entirely dependent on the secondary data taken from the EMRI's own reports. Though EMRI has been cooperative in sharing all the information we asked for, our information is limited to what is collected from them from their internal monitoring and analysis systems and there is no independent validation of this data or primary data collection.

² The per trip cost is likely to fall with increase in utilization (number of trips per day) and is estimated to stabilize around Rs. 475/- per trip for an ambulance making around 8 trips per day, at current costs/prices. But as the prices of fuel and medical consumables are expected to rise further, the unit cost can rise. Also stabilization of unit cost per trip doesn't stop the total operating cost per ambulance per year from rising, which will rise with the number of trips.

The Objectives of this study could be stated as follows:

First Part:

1. To examine the design aspect and the framework of the EMRI model, in the context of larger health systems issues and ERS requirements, including equity issues and institutional frameworks including governance and accountability issues.
2. To review the operational aspects of EMRI scheme in the sample states of Andhra Pradesh, Gujarat and Rajasthan. This would include operational efficiency of EMRI, financial management, and management of contractual obligations.
3. To examine and comment on patterns of utilisation of services in three sample states to understand present and potential demand for these services and the effectiveness of EMRI to respond to this

Methodology of the study:

First Part: Overview Appraisal

Interviews with EMRI:

Collection of key documents and analysis of data presented by EMRI to understand and recommend on utilisation, requirements, effectiveness and efficiency of operations, financing arrangements and governance mechanisms and institutional frameworks.

Second part:

To undertake a sample study, using a small number of research teams, across three states with the purpose of

- a. Validating data presented by EMRI.
- b. Understand further on patterns of use, and equity issues.
- c. Examine HR issues related to service delivery.
- d. Look at quality of service delivery

Many of the questions that would be examined by the second part of this study would be raised by this first part.

III. Findings of the Study

1. EMRI in Andhra Pradesh

EMRI began operations in Andhra Pradesh (AP) on August 15th, 2005 with a fleet of 30 ambulances contributed by Shri.R. Raju and family, across 50 towns of the state. The Call Centre for its operations, including the campus of EMRI was established by Shri Raju in its own premises. The GIS based software for providing the back-end support from the Call

Centre is developed by Satyam and maintained by EMRI, though for updating it, Satyam's support is needed. It was responsible for handling medical, police and fire emergencies through the *108 Emergency Service*. Later Shri Raju donated another 40 ambulances to EMRI in the year 2006-07, making a total of 70 ambulances run by EMRI on its own. In the third year of operations (2007-08) EMRI expanded the ERS to the entire state of Andhra Pradesh in PPP mode, with the Government of AP contributing additional 432 ambulances, bringing the total ambulances in operations to 502. As on February 15th 2009, EMRI in AP has a fleet of 652 ambulances operating in all 23 districts in the state. Going by the EMRI's criteria of having one ambulance per one lakh population, they should be having 815 ambulances (population of AP is 8.15 crores). Further the government proposed to expand the EMRI fleet to 902 ambulances in 2009-10 and then to 1107 ambulances in the next year, which is calculated on the basis of one ambulance per *Mandal*³.

As told by Shri. Venkat Changavalli (CEO, EMRI) to the appraisal team⁴, the Govt. of AP was contributing 50% of the operating cost in the 3rd year (2007-08, with 70 EMRI ambulances and 432 Govt. ambulances). From the 4th year onwards (2008-09), as per the MOU, the government is contributing 95% of the operating cost. The rest of the capital costs however are borne by EMRI- an arrangement that differs from that of all other states. These capital costs include the cost of the Call Center, the costs of the administrative and training infrastructure, leadership cost (includes salaries of senior managers), and the technology development costs. The Govt. of AP share of the cost is charged under the NRHM. The emergency transportation provided in a state-of-the-art ambulance is, free, coordinated by a state-of-art emergency call response centre, which is operational 24 hours a day, 7 days a week. In addition, the call to the number 108 is a Toll Free service accessible from landline or mobile.

According to the EMRI data of daily ambulance operations in the state, the service in AP operating with a fleet of 652 ambulances covering 23 districts, and the call centre receives around 54,000⁵ calls in a day. Of these, ambulances are despatched for around 8% calls, on an average. EMRI has tie ups with 3331 private hospitals in Andhra Pradesh, apart from the government hospitals that can handle emergencies. These hospitals provide free stabilization services for the first 24 hours to the patient. As per the same data sheet, around one-fifth (21%) of the emergencies transported are delivery related complications, and around the same proportion are injury related emergencies. EMRI reports around 65% of the emergency cases being transported to government hospitals.

³ Equivalent of a Block in Andhra Pradesh

⁴ In the meeting with EMRI officials with the GoI team on EMRI appraisal on December 23rd, 2008.

⁵ See Annex 15-A: Emergency Call Daily Report 03 November 2008

The ambulances have been designed with a uniquely Indian perspective. The ambulances are based on a Mercedes Benz design built by a local licensee. In addition to space for the patient and paramedic in the back, it features a bench seat for family members who often accompany a patient in India. The ambulances include bigger oxygen tanks, as they will often be heading into rural areas where they can't rely on quick refills. It is equipped with cutting gear and other rescue equipment. It has a washbasin with a foot operated tap. It has three types of carrying stretchers for different situations, each of which is designed to make it easy to lift and transport a patient in and out of the ambulance. Its doors open all the way and allow maximum access. It is fitted with lights outside on the sides that could help in the dark in a disaster situation. It has a public address system. This is the basic life support (BLS) ambulance. An advanced life support (ALS) version is available with cardiac monitor and defibrillator in addition to all the provisions of a BLS ambulance.

As told by the Shri. Changavalli, initially the Indian-built ambulances cost about Rs. 21 lakhs (US\$ 40,000 approx.) for an ALS and about 15 lakhs (US\$ 30,000 approx.) for the BLS ambulance, compared to the US\$ 120,000 for a similar (ALS) ambulance in the west. But, as corroborated by the audited statements of expenditure for the year 2008⁶; with the increase in numbers, this cost (capital cost of ambulances procured) has come down to Rs. 15 lakhs (US\$ 30,000 approx.) for the ALS and 11 lakhs for the BLS (US\$ 22,000 approx.). Procurement of its 70 ambulances was done by EMRI as per its own procedures. For the 432 ambulances, purchase was done through tendering by the government, and for fabrication and equipment, tendering was done by the EMRI. The tendering committee for both was the same with two representatives of the government and two from the EMRI.

Comparing these audited statements of expenditures and the daily reports of ambulance usage, each ambulance is averaging 8.1 trips per day, thus resulting in an operating cost per ambulance of Rs. 565⁷ per trip per day, or Rs. 12.59 lakhs per year, approximately. These figures are based on EMRI reports. Payments are made on the basis of operating costs as presented periodically. There is no process of independent or third-party validation in place in the state. Looking at the break-up of operating cost, we find that in Rajasthan, salary (of operations staff) consumes 27% of the opex, administrative expenses are 31% and cost of running the ambulances is only 41% of the opex. This is when the ambulance usage has stabilised at around 8 trips per ambulance per day.

In Andhra Pradesh, there is another service for remote medical care wherein a person can dial 104 and avail of free medical advice from health care professionals. This is managed by another body called the Health Management and Research Institute (HMRI), which was also

⁶ See Annex 4-A (Latest periodic data (April-December 2008), and Annex 5-A (Balance sheet for the year 2007-08)

⁷ For 502 ambulances running between April and December 2008, although with the increase in fleet, presently (Mar '09) there are 652 ambulances running in Andhra Pradesh.

promoted by Shri Raju, and was possibly linked to Satyam. Calls to 104 are prioritized and callers routed to appropriate destinations, including 108 if an ambulance is required. Though in name and in basic design there are parallels, the HMRI operations are quite independent of the EMRI and would need to be evaluated independently. Given an investment of over Rs.250 crores in the HMRI, this too would need an independent evaluation.

2. EMRI in Gujarat

EMRI began operations in Gujarat with the signing of the MOU with Government of Gujarat and launching of operations on August 29, 2007 with a fleet of 61 (20 ALS and 41 BLS)⁸ ambulances across 42 towns (in 9 districts) of the state. The capital cost for purchase and equipping the ambulances as well as for land and building of the call centre, was provided by the Govt. of Gujarat (GoG) under NRHM. Under the MOU the GIS based software for providing the back-end support from the Call Centre was to be commissioned and maintained by EMRI. EMRI was responsible for handling medical, police and fire emergencies through the *108 Emergency Service*. In the subsequent year 2008, the operations were extended to the entire state with 380 (33 ALS and 347 BLS) ambulances across 319 cities in all the 26 districts⁹. The February 17th report (Annexure A-16) shows the number of ambulances as 402.

The Govt. of Gujarat is contributing 95% of the operating cost and 100% of the capital cost (of ambulance purchase, fittings, land and building for the state level Call Centre). The Govt. of Gujarat's share of the cost is charged under the NRHM. The emergency transportation in the form of a state-of-the-art ambulance is provided free, coordinated by a state-of-art emergency call response centre, which is operational 24 hours a day, 7 days a week. In addition, the call to the number 108 is a Toll Free service accessible from landline or mobile. The features of the ambulance and the organisation of the service is the same as described for Andhra Pradesh.

According to the daily ambulance wise reports received from EMRI by the GoG¹⁰, the service in Gujarat operating with a fleet of 61 ambulances in 2007 averaged a little over one (1.44) trip per ambulance per day, which increased to over four (4.31) trips per ambulance per day in 2008, with a fleet of 380 ambulances. Also, as per the daily report of Dec 31, 2008, ambulances were despatched in the case of 8.24% of all the calls received since the operations began in Gujarat. Of these despatches, Medical Emergencies were almost 99%,

⁸ BLS is Basic Life Support ambulance equipped with routine equipment like emergency resuscitation kit, oxygen cylinder, IV fluid and stand, etc.; whereas ALS (Advanced Life Support) ambulance has additional equipment like ventilator and defibrillator.

⁹ See Annex 6-G (Ambulance wise emergency dataset dated 14/01/09)

¹⁰ See Annex 6-G (Ambulance wise emergency dataset dated 14/01/2009)

Police emergencies were 1% and 0.2% were fire emergencies. Looking at the breakup of medical emergencies, 33.7% were pregnancy related, 17.4% were accident/trauma cases, 5.8% were other trauma cases and 1.96% was assault related injuries¹¹. EMRI has tie ups with 2050 private hospitals in Gujarat, apart from 1381 government hospitals that can handle emergencies. These hospitals provide free stabilization services for the first 24 hours to the patient. The Gujarat government also has various PPP schemes (like Chiranjivi, Bal Sakha yojana, RSBY), which ensures cashless hospitalisation care and treatment for the patients, especially BPL, brought in by the EMRI ambulances,

The ambulances are procured from Force Motors, complete with fittings as per the standards prescribed by EMRI. As per the MOU signed between GoG and EMRI, the procurement of these ambulances is done by EMRI with funds from the GoG (@ Rs. 15.75 lakhs for ALS and Rs. 9.75 lakhs for BLS ambulances). Analysing the audited expenses statements of EMRI Gujarat for 2007-08 and 2008-09 (half-year till Sep '08¹²), we find that the expenditure was Rs.28.27¹³ lakhs per ambulance (capex) in the 1st year (for 60 ambulances), which came down to Rs. 11.18 lacs per ambulance for the full fleet of 380 ambulances in the second year¹⁴. Similarly, the operating expenses (opex) per trip were Rs. 2,871.72 in the 1st year (i.e. Rs. 11.37 lakhs per ambulance for the 9-month period, with 60 ambulances), which came down to Rs. 634.85 per trip in the 2nd year (i.e. Rs. 3.34¹⁵ lakhs per ambulance for the 6-month period). The audited statements also reveal that the share of EMRI's own funds in the total operating expenses were to the tune of 25% in the 1st year which came down to 5% in the 2nd year of operations in Gujarat. It was later clarified that even these are notional book entries- in effect the EMRI's share in Gujarat is nil and thus EMRI has been functioning as fully government paid scheme. Looking at the break-up of operating cost, we find that in Rajasthan, salary (of operations staff) consumes 42% of the opex, administrative expenses are 27% and cost of running the ambulances is only 31% of the opex. Gujarat has relatively low proportion of administrative costs as according to EMRI, the Gujarat operations has yet to undertake the full investment in terms of the supporting infrastructure and staff needed to run the number of ambulances that is operational. For example, whereas the operational staff to ambulance ratio is around 7 for both AP and Rajasthan, it is 5 for Gujarat.

¹¹ See Annex 7-G (Emergency response centre daily report for Gujarat dated 31/12/2008)

¹² Annex 5-G (Audited quarterly utilisation certificates and statements of expenditure for quarter ending Sep '07 and quarter ending Dec '08)

¹³ This includes the cost of setting up the infrastructure for call centre, training facilities, etc. Of this, actual cost of ambulance procurement was only around Rs. 11 lakhs per ambulance.

¹⁴ Procurement of ambulances in second year was done through e-tendering by a special committee set up with three officials from GoG- Addl Director, Medical Services, Financial Advisor, Health, and Director, Central Medical Stores Organization, to ensure transparency and competitiveness.

¹⁵ The operating cost per ambulance in Gujarat is relatively lower presently as according to EMRI the Gujarat operations has yet to undertake the full investment in terms of the supporting infrastructure and staff needed to run the number of ambulances that is operational. For example, whereas the operational staff to ambulance ratio is around 7 for both AP and Rajasthan, it is 5 for Gujarat.

The state of Gujarat has also undertaken a unique initiative regarding the Emergency Medical Services (EMS) in the state. In order to provide a legal and regulatory framework for a comprehensive EMS, the Govt. of Gujarat enacted the Gujarat EMS Act¹⁶, which came into force on February 2007. The EMS Act provided the framework to the GoG under which it went ahead with the MOU with EMRI.

3. EMRI in Rajasthan

EMRI began operations in Rajasthan with the signing of a 5-year MOU with Government of Rajasthan and launching of operations in May, 2008¹⁷. As of February 2009¹⁸, EMRI Rajasthan has a fleet of 100 ambulances across 58 towns (in 33 districts) of the state. The state plans to have a total fleet of 450 ambulances in the state with EMRI. The capital cost for purchase and equipping the ambulances as well as for land and building of the call centre, was provided by the Govt. of Rajasthan (GoR) under NRHM. Under the MOU the GIS based software for providing the back-end support from the Call Centre was to be commissioned and maintained by EMRI. EMRI is responsible for handling medical, police and fire emergencies through the *108 Emergency Service*.

As per the MOU, the Govt. of Rajasthan is supposed to contribute 95% of the operating cost and 100% of the capital cost (of ambulance purchase, fittings, land and building for the state level Call Centre, etc.). The Govt. of Rajasthan's share of the cost is charged under the NRHM. The emergency transportation provided in a state-of-the-art ambulance is free, coordinated by a state-of-art emergency call response centre, which is operational 24 hours a day, 7 days a week. In addition, the call to the number 108 is a Toll Free service accessible from landline or mobile.

According to the GoR data, the service in Rajasthan operating with a fleet of 100 ambulances in 2008-09 averaged about two (1.14¹⁹) trips per ambulance per day, travelling a distance of around 16 km per day per ambulance, meaning the ambulances are averaging a little less than 15 km per trip. As the operations began with 50 ambulances initially and the other 50 were added to the fleet around Nov-Dec 2008, the later 50 ambulances are averaging less than one trip per day (till Feb '09). Also, as per the data provided by EMRI and the GoR for 2008-09 (Ambulance wise details of despatches and distance travelled dated 18th February 2009, and Daily call and despatch report by type of emergency dated

¹⁶ See Annex G-1: Gujarat Emergency Medical Services Bill, 2007

¹⁷ Annex 1-R (MOU between GoR and EMRI)

¹⁸ Annex 7-R (Ambulance wise details of despatches and distance travelled, dated 18th February 2009)

¹⁹ Calculated assuming an average of 4 months (120 days) for the ambulances as 6 months to 2 months old. Data has been based on Annex 7-R (Ambulance wise details of despatches and distance travelled dated 18th February 2009) and Annex 8-R (Daily call and despatch report by type of emergency dated 18-02-2009)

18-02-2009), ambulances were despatched in the case of 1.21% of all the calls received. Medical Emergencies were 78% of all the cases transported, of which 20% were pregnancy related and almost 40% were trauma cases. For the month of February 2009 (till 18th Feb), the corresponding figures showed that 1.46% of calls required despatches. Of these, 82% were medical emergencies and 18% were police calls. Of the medical emergencies, 42% were trauma related, of which 38% were RTA (Road Traffic Accidents) and 25% were pregnancy related, while 21% fell into “others” category.

The ambulances are procured from TATA Motors, complete with fittings as per the standards prescribed by EMRI. The procurement of these ambulances is done by EMRI with funds from the GoR, projected (as per the MOU) at an average capital cost of Rs. 24 lacs per ambulance, including cost of IT and call-centre infrastructure. Similarly, the opex was projected in the MOU to be around Rs. 11.47 lacs per ambulance per year. Analysing the audited balance sheet and expenses statements of EMRI Rajasthan for 2008²⁰ (till Dec '08), we find that the expenditure was Rs. 34.06²¹ lacs per ambulance (capex for 100 ambulances in the 1st year). Similarly, the operating expenses (opex) per ambulance were Rs. 11.96 lacs (annualised). Looking at the actual number of trips and kilometres travelled by the ambulances (adjusted on pro-rata basis till Dec '08) the operating cost turns out to be Rs. 2,700/- per trip. The audited statements also reveal that the share of NRHM's funds in the total cost (opex + capex) were in the tune of 98% in the year 2008. It also shows that capital cost is 73% of the total cost (this being the 1st year of operations). Looking at the break-up of operating cost, we find that in Rajasthan, salary (of operations staff) consumes 47% of the opex, administrative expenses are 38% and cost of running the ambulances is only 15% of the opex. This clearly hints at low usage of the vehicles.

4. Comparative Analysis of Key Findings

The findings of the EMRI appraisal in the three states of Andhra Pradesh, Gujarat and Rajasthan, based on the interactions with the key officials as well as analysing the documents, reports and audited statements, are summarised in the table below.

Table 2: Comparative analysis of EMRI provided Emergency response services (ERS) in AP, Gujarat, and Rajasthan

Indicators	Andhra Pradesh	Gujarat	Rajasthan
1. Present no. of ambulances	652	402	100
<i>Data Source:</i>	<i>Annex 16-A (National performance daily report for 17th Feb '09)</i>	<i>Annex 16-A (National performance daily report for 17th Feb '09)</i>	<i>Annex 16-A (National performance daily report for 17th Feb '09)</i>

²⁰ Annex 3-R (Audit report of EMRI Rajasthan for three quarters ending 31st December 2008)

²¹ This includes the cost of setting up the infrastructure for call centre, training facilities, etc. Of this, actual cost of ambulance procurement was only around Rs. 11 lakhs per ambulance.

Indicators	Andhra Pradesh	Gujarat	Rajasthan
2. MOU effective since... (till Feb '09)	April 2005 (4 years)	August 2007 (1.5 years)	May 2008 (9 months)
<i>Data Source:</i>	<i>Annex 1-A (MOU between GoAP and EMRI)</i>	<i>Annex 2-G (MOU between GoG and EMRI)</i>	<i>Annex 1-R (MOU between GoR and EMRI)</i>
3. MOU/contract period	1-year, renewable	5-years, renewable	5-years, renewable
<i>Data Source:</i>	<i>Annex 1-A (MOU between GoAP and EMRI)</i>	<i>Annex 2-G (MOU between GoG and EMRI)</i>	<i>Annex 1-R (MOU between GoR and EMRI)</i>
4. Average no. of trips per ambulance per day	8.1	4.31 (1.94 in the 1 st year)	1.14
<i>Calculated from:</i>	<i>Annex 15-A: Emergency Call Daily Report 03 November 2008</i>	<i>Annex 6-G (Ambulance wise emergency dataset dated 14/01/2009)</i>	<i>Assuming an average of 4 months (120 days) per ambulances, based on Annex 7-R (Ambulance wise details of despatches and distance travelled dated 18th February 2009) and Annex 8-R (Daily call and despatch report by type of emergency dated 18-02-2009)</i>
5. Distance travelled per trip	29 km	30 km	14.38 km
<i>Calculated from:</i>	---	---	<i>Annex 7-R (Ambulance wise details of despatches and distance travelled dated 18th February 2009)</i>
6. Ambulances dispatched as percentage of calls received	8%	8.24%	1.21%
<i>Calculated from:</i>	<i>Annex 15-A: Emergency Call Daily Report 03 November 2008</i>	<i>Annex 7-G (Emergency response centre daily report for Gujarat dated 31/12/2008)</i>	<i>Annex 8-R (Daily call and despatch report by type of emergency dated 18-02-2009)</i>
7. Pregnancy related cases as percentage of emergencies transported	21%	33.7%	20.13%
<i>Data Source:</i>	<i>Annex 15-A: Emergency Call Daily Report 03 November 2008</i>	<i>Annex 7-G (Emergency response centre daily report for Gujarat dated 31/12/2008)</i>	<i>Annex 8-R (Daily call and despatch report by type of emergency dated 18-02-2009)</i>
8. Trauma/accident cases as percentage of emergencies transported	18%	23.2%	39.13%
<i>Calculated from:</i>	<i>Annex 15-A: Emergency Call Daily Report 03 November 2008</i>	<i>Annex 7-G (Emergency response centre daily report for Gujarat dated 31/12/2008)</i>	<i>Annex 8-R (Daily call and despatch report by type of emergency dated 18-02-2009)</i>
9. Resources contributed by EMRI	70 ambulances, call centre (building & equipment), GIS software for backend support	GIS software for backend support	GIS software for backend support
<i>Data Source:</i>	<i>Annex 3-A (powerpoint presentation of EMRI services in AP, 20th Feb 2009)</i>	<i>Annex 2-G (MOU between GoG and EMRI)</i>	<i>Annex 1-R (MOU between GoR and EMRI)</i>
10. Total Capital cost per Ambulance	Rs.11 lacs (Rs. 21 lacs in 1 st)	Rs.11.18 lacs (Rs. 28.27 lacs in 1 st)	Rs. 34.06 lacs (it is the 1 st year of

Indicators	Andhra Pradesh	Gujarat	Rajasthan
	year)	year)	operations)
Calculated from:	Annex 4-A (Latest periodic data (April-December 2008), and Annex 5-A (Balance sheet for the year 2007-08)	Annex 5-G (Audited quarterly utilisation certificates and statements of expenditure for quarter ending Sep '07 and quarter ending Dec '08)	Annex 3-R (Audited report of EMRI Rajasthan for three quarters till 31st Dec '08)
11. Total Operating cost per ambulance (annualised)	Rs. 12.59 lacs	Rs. 6.68 ²² lacs (Rs. 11.37 lacs in the 1 st year)	Rs. 11.96 lacs
Calculated from:	Annex 4-A (Latest periodic data (April-December 2008), and Annex 5-A (Balance sheet for the year 2007-08)	Annex 5-G (Audited quarterly utilisation certificates and statements of expenditure for quarter ending Sep '07 and quarter ending Dec '08)	Annex 3-R (Audited report of EMRI Rajasthan for three quarters till 31st Dec '08)
12. Operating cost per trip	Rs. 565/-	Rs. 635/- (Rs. 2,872/- in the 1 st year)	Rs. 2,700/-
Calculated from:	Annex 4-A (Latest periodic data (April-December 2008), and Annex 5-A (Balance sheet for the year 2007-08)	Annex 5-G (Audited quarterly utilisation certificates and statements of expenditure for quarter ending Sep '07 and quarter ending Dec '08), and Annex 6-G (Ambulance wise emergency dataset dated 14/01/2009)	Annex 3-R (Audited report of EMRI Rajasthan for three quarters till 31st Dec '08), and Annex 8-R (Daily call and despatch report by type of emergency dated 18-02-2009)
13. Share of EMRI in operating cost	none in the current financial year (2008-09)	5% As per clarifications by EMRI, this is because of an error in booking the amounts. In effect, there had been no transfer of funds from EMRI to state's operations	0.00% As per clarifications by EMRI, this is because of an error in booking the amounts. In effect, there had been no transfer of funds from EMRI to state's operations
Calculated from:	Annex 4-A (Latest periodic data (April-December 2008)	Annex 5-G (Audited quarterly utilisation certificates and statements of expenditure for quarter ending Sep '07 and quarter ending Dec '08)	Annex 3-R (Audited report of EMRI Rajasthan for three quarters till 31st Dec '08)
14. Salaries of service providers (operational staff) as percentage of total operating cost	27.30%	41.89%	46.51%
Calculated from:	Annex 4-A (Latest periodic data (April-December 2008), and Annex 5-A (Balance	Annex 5-G (Audited quarterly utilisation certificates and statements of	Annex 3-R (Audited report of EMRI Rajasthan for three quarters till 31st Dec '08)

²² Rs. 3.34 lakhs for the 6-month period from April to September 2008. This is very low as EMRI Gujarat has yet to undertake the full investment in terms of the supporting infrastructure and staff needed to run the number of ambulances that is operational. For example, whereas the operational staff to ambulance ratio is around 7 for both AP and Rajasthan, it is 5 for Gujarat.

Indicators	Andhra Pradesh	Gujarat	Rajasthan
	<i>sheet for the year 2007-08)</i>	<i>expenditure for quarter ending Sep '07 and quarter ending Dec '08)</i>	
15. Administrative overheads as percentage of total operating cost	31.37%	27.26%	38.32%
Calculated from:	Annex 4-A (Latest periodic data (April-December 2008), and Annex 5-A (Balance sheet for the year 2007-08)	Annex 5-G (Audited quarterly utilisation certificates and statements of expenditure for quarter ending Sep '07 and quarter ending Dec '08)	Annex 3-R (Audited report of EMRI Rajasthan for three quarters till 31st Dec '08)
16. Direct vehicle/ambulance operations and maintenance cost as percentage of total operating cost	41.33%	30.85%	15.17%
Calculated from:	Annex 4-A (Latest periodic data (April-December 2008), and Annex 5-A (Balance sheet for the year 2007-08)	Annex 5-G (Audited quarterly utilisation certificates and statements of expenditure for quarter ending Sep '07 and quarter ending Dec '08)	Annex 3-R (Audited report of EMRI Rajasthan for three quarters till 31st Dec '08)
17. Ratio of staff (operational staff) to Ambulance	7.41 per ambulance	5.24 per ambulance	6.87 per ambulance
Calculated from:	State wise headcount of EMRI as on 28/02/2009, and Annex A-6 (National Performance Daily Report 17 Feb 09)	State wise headcount of EMRI as on 28/02/2009, and Annex A-6 (National Performance Daily Report 17 Feb 09)	State wise headcount of EMRI as on 28/02/2009, and Annex A-6 (National Performance Daily Report 17 Feb 09)

IV. Analysis & Discussion

1. Need and Utilization of Services:

- a. Popular: Undoubtedly the service is popular. This is based on reports in the media and the perceptions of all authorities met, and the wide spread political support the project enjoys. It is also based on the testimonies of many public health observers and assessors, including the members of this team, who have visited emergency rooms to study the EMRI in operation. The tremendous gratitude and praise of the family members of the accident victim for the timely arrival of this angel of mercy when heard in first person is most convincing and moving. And there are thousands of families in which the lives of loved ones have been saved, who would be willing to shower EMRI with praise and call for the strengthening of this system- whatever it takes to do so.
- b. Rising Utilization: The utilization rates are typically low in the first year, but seem to increase considerably in the second year and continue to increase every year afterwards. This could explain the differences seen between Rajasthan which is 6-9 months old, Gujarat where it is one-and-half years old and Andhra Pradesh which is

three years old. In a recent estimate for the first 17 days of February, Rajasthan had 4.3 dispatches per ambulance, Gujarat had 5.4 and Andhra had 8.1 ambulance trips per day. Utilisation is not related only to the duration of MOU, as revealed from the fact that Goa, a recent start up has 4.5 ambulances dispatched per day, whereas Uttaranchal has only 2.7 ambulance trips per day (Annex A-16).

- c. Pattern of Utilization: Much of the utilization is medical emergencies. In Andhra Pradesh (using the national EMRI report for 17th February – annex A-16) it accounts for 96.7%, in Gujarat it accounts for 98.7% and in Rajasthan it accounts for 84.4%. In Rajasthan there is a substantial degree of usage by the police department (almost 15.4%), a level which none of the other eight states comes anywhere near. Of the medical emergencies, the largest proportion is pregnancy related accounting for 22% in Andhra Pradesh, 37% in Gujarat and 27% in Rajasthan. The second most common reason is trauma accounting for 20% in Andhra Pradesh, 21% in Gujarat and 40% in Rajasthan. The other high frequency cause is acute abdomen, which is about 15.7% in Andhra Pradesh but only 4.5% in Gujarat and 3.2% in Rajasthan. All other causes range less than 5% and include animal bites, epilepsy, cardiovascular emergencies, respiratory emergencies, suicides and poisonings and acute abdomen.
- d. Quality of services: It has two dimensions – one is the promptness with which the ambulance arrives and the second is the care provided en-route. On the latter there is investment in training a cadre of paramedical staff and equipping the ambulances with all the necessary equipment and consumables. This is laudable. There are also moves to institutionalize such training and create a new human resource dedicated to emergency care. The training infrastructure at EMRI Hyderabad is impressive. There are classrooms training, hostels for the trainees, training equipment, and training protocols, and processes in place for testing and certifying skills. The same intensity may not be available in all the states, given the rate of expansion, but there is a commitment to reach quality on this. The system is aware of every aspect of quality of care during transport, before reaching the health facility and they are working to improve this dimension. In their own admission, there is more to be done, but they are seized of it. On promptness, the popular perception is of reaching every urban call within 20 minutes and every rural call within 40 minutes is being achieved. Detailed discussion shows a much more varied picture. What is worth noting is that there is an objective, documented and verifiable system in place for measuring the time taken from the moment of receiving the call, to the moment of reaching the patient, and the time taken to deliver the patient to the facility. This system is well monitored and supervised. And this information is acted upon regularly to improve performance through a system of detailed analytic reviews. On request, EMRI provided us with figures that showed the range of time taken, as also the cases where there was considerable delay. A common reason for delays was that the ambulance was busy attending another. Once the ambulance reaches an average of 8 to 10 trips per day, delays become almost invariable - necessitating the addition of

another ambulance in the same area. We note that Andhra Pradesh was reported/perceived to have achieved 100% coverage with 502 ambulances, and then a further 150 ambulances were added and justified as necessary to take it to full coverage and now a further 455 ambulances are proposed- again for reaching 100% coverage. A more detailed and nuanced understanding after a discussion of this aspect with EMRI shows that at 502 ambulances the coverage was about 85%, rising to 94% with 150 more ambulances and to 99% - a 4% increase in coverage with an addition of 455 ambulances. Not only does this show that the last mile in terms of geographic coverage requires a disproportionately high increase of ambulances, but also that in areas already covered density of ambulances would also have to rise with increased utilisation- so as to guarantee quality- in terms of promptness.

- e. Hospital linkages: One of the key functions that EMRI performs is to recruit private hospitals who would participate in the ERS and this would imply cashless service for the first 24-hours till the patient is stabilized. For this purpose EMRI has met with large numbers of private hospitals and signed MOUs with them. These MOUs play a limited role now - merely to formalise an understanding that the hospital would not refuse admission if a patient is brought to it. But there is no process of accreditation or certification and even information about the variety of services available is limited. We do know that the percentage of referrals to private sector is 35% in Andhra Pradesh. Rajasthan, being in their 1st year of operations, is still almost fully dependent on government hospitals and private hospitals are in the process of being engaged by EMRI Rajasthan. EMRI states that the choice of hospital to be taken to, lies only with the patient. In case the patient is unconscious or not able to exercise choice, then the choice is assumed to be the nearest public hospital. There is an EMRI plan to gather more details of services available in each hospital, but it is not fully functional. There are instances of private hospitals, even those with MOUs, refusing admission, but these are exceptions and are reported as “usually resolved by interactions”. There is however no record or track of quality of care on arrival and on refusals to care. Clearly it is not the EMRI's responsibility, if it turns out that the services are not available and the patient has to be transferred to another facility. What are the numbers that need to move out again due to lack of funds and what happens if they cannot pay but are very sick? Not much attention has gone into the rest of emergency medical service- the cost and quality of care after the transportation is over.

Key Discussion Issues:

How high could utilization rise? What is the requirement for these services?

- One of the key issues is to understand what the absolute needs for ERS are, in quantitative terms, and what part of it is being currently catered to. The utilization curve is ever-rising, but would it ever plateau, and if so, at what level? One possible way of estimating this is to visit a hospital which is a main centre for managing emergencies

and measure what percentage of emergencies received was transported by EMRI and what was transported by other means? We could assume that most of this would get increasingly transferred to EMRI as awareness would grow and as this service is completely free. The second reason for a rise in utilisation would be an increase in the range of emergencies for which EMRI is sought. Current trend is to begin with injuries and with pregnancies going into labour and then as information spread, the cause for the call begins to diversify further. Currently, acute abdomen is the next major cause and use for cardiovascular emergencies, and epilepsy is also rising. Thus, with increased awareness, the indications for which an emergency response is sought could go up dramatically. For example, what would be the implication if every pregnancy requiring institutional delivery seeks the ERS, even where there is no emergency and private means of transport are available? What if, a much larger proportion of asthma and epilepsy sought an emergency response? We know that by recommendations, at least 50% of acute chest pains admitted in an ICU should be false alarms in order to be certain that we are able to capture every true case in time. So, even false calls could be justified medically. There would also be a large number of emergencies which are currently not seeking any care who would start using this service in future. Patterns would vary across states, like Kerala and Rajasthan, and would also differ between urban and rural areas, deserts, and tribal areas.

- Finally utilization patterns would also go up due to the problems of over-consumption or inappropriate consumption (moral hazard). This problem is characteristic of many areas of medical care and insurance based service provisioning models. There is every reason to believe that a cashless service like EMRI would also be subject to this problem. The real danger of this is that above 8 trips per day, any such inappropriate care would frequently displace more critical emergencies. And it is not as if inappropriate care would start only above a particular level of utilisation, it would be there at current levels of utilisation as well. We need to answer these questions now, as we are expanding the ERS in the country.
- The ball park figure from international studies, quoted in the EMRI's feasibility report is 8% medical emergencies annually – or in other words 8000 emergencies in a population of 1 lakh or about 22 medical emergencies per day.

How many ambulances would be needed?

- This is another question that states are facing. The norm, that EMRI is using, is one per lakh population. Both Gujarat and Andhra have projected 100% coverage with the number of ambulances, as shown in Table 1, but they may be short of this norm of one per lakh by 25%. If we count the 150 ambulances added since December, then Andhra Pradesh would have achieved the norm. However we know that a) Andhra Pradesh has sought another 300 ambulances to achieve 100% coverage and b) that currently by its own estimate it is reaching only 32% of all emergencies. If achieving an ideal time of

response is a mandatory part of the definition then it has implications for declaring the achievement of 100% coverage. There are two factors that influence promptness of response – the first is geography and the second is rate of utilisation. Thus on a road which allows an average of 60km per hour (national highway in the Indian context) that would mean an ambulance has to be stationed within 40 km of every habitation. If the roads are such that it allows only an average of 30km per hour (all village roads, hilly terrain and non-metalled roads) than we need an ambulance within every 20 km of every habitation. If this is the target, then, even 1100 ambulances in Andhra would not be able to delivery that, though it would be nearer to it. Rajasthan has now only 21% coverage with 100 ambulances, all of which is urban or semi-urban. Should it aim to cover the sparsely inhabited desert areas on a 40 minute norm and create more affordable norms for such areas? How much should it aim for given its deserts and tribal regions? In Gujarat, how many ambulances should be deployed in Kutch as compared to Mehsana district? But in the desert or tribal areas with dispersed small size habitations, if the number of ambulances per lakh population decreases, then utilization per ambulance would fall and subsequently the unit cost would rise.

- We note that currently EMRI is allowed to set a point as nearest road pick-up point for every habitation and the 40–minutes response time is counted to that point. The discretion on locating these pick up points and even of locating the ambulances itself is with EMRI and has been done with the guidance from GIS inputs and some consultation with the department.
- The other factor in deciding on number of ambulances is utilisation. EMRI reports that above a frequency of 8 patients per day, delays become frequent because of ambulance being busy with another case or with repairs and maintenance. An ambulance could achieve such a rate of utilisation within two or three years of its operation. One would therefore necessarily have to add a second ambulance after two to three years into the same population- a phenomenon that is clearly seen in places like Nellore where the programme is into its fourth year. A second ambulance in the same lakh population lowers the number of cases per ambulance initially and then it starts rising again. If the expected absolute requirement in a population per one lakh is 22 cases per day, then even at 70% effectiveness two ambulances are required. (8 cases per day per ambulance).
- We could conclude by saying that though reaching in 20 minutes in urban areas and 40 minutes in rural areas is the desirable norm, it is likely that in a large number of areas, for a considerable percentage of trips, this quality of response is as yet unattainable. If we were we to attain universal ERS, we would probably require about two ambulances per 1 lakh population each doing 8 to 11 trips per day in an area with average population density. With decreasing population densities, progressively more ambulances per lakh population and less number of trips per ambulance with a higher cost per trip would be required. From this ball park figure we could project future utilisation trends and costs.

Today Andhra is reaching 8 trips per ambulance per day with one ambulance per 1.23 lakh population at Rs 600 per ambulance trip or Rs 17.5 lakhs per ambulance per year and for 652 ambulances the current year's PIP bills Rs 114 crores. If this were to increase to two ambulances per one lakh population, i.e 1600 ambulances for the state and 11 trips per day per ambulance and also assume that average cost per trip were to stabilise at a lower Rs 475 per trip (estimate on optimum efficiency) then the costs would plateau at about Rs 304 crores - at current rates and without adjusting for the increased costs of low population density and high dispersion areas. Thus in Andhra Pradesh the expenditure is currently about Rs 14 crores per crore of population per year and this could plateau at Rs 38 crores expenditure per crore of population per year for the provision of universal ERS. This matches with EMRI's internal estimates, which shows that EMRI in Andhra Pradesh is handling only about one third of all emergencies today. And improved preventive public health action is probably not going to reduce incidences of emergencies for decline in pregnancies and communicable disease and road traffic accidents would be offset by increases in non communicable disease emergencies.

- What about inter-hospital transfers? In all states, transfers between hospitals are not covered by the MOU. Government owned and operated ambulances were playing this role and therefore a parallel fleet of ambulances becomes necessary even where there is EMRI. There are two views on this. The concern of the government has been that EMRI or whatever ERS is put in place must take care of inter-hospital transfers too- thus saving the government from a duplicating its expenses. EMRI on the other hand is concerned that if it agrees to this, a considerable part of its resources would be shifted to this task - which they estimate at 18% increase over current requirements. This would displace the priority of ERS. Shifting a case from a block to a district hospital would mean a longer travel time and therefore for a longer time the ambulance would be busy and unavailable. An even greater concern is that many hospitals would, for a variety of reasons, decide to pass many patients brought to it either by cherry picking "paying" cases with less complexity, or avoiding the risks of managing more serious and potentially fatal cases. This refusal to inter-hospital transfers is in EMRI's view useful to force the clinic to take ownership and start stabilisation and care.
- The Public Sector Ambulance; Given the issues raised by EMRI and also the large gap between the desired number of ambulances and the numbers we are in a position to deploy, there is case for retaining the public facility's ambulance in the block level CHC and even introducing it in the sector level PHC - where the IPHS has mandated it. Provided with the same call system and linked to the EMRI call center it could act as a back up in cases where the EMRI ambulance is too busy, as also be available in disasters. It could also help in reducing response and travel time in distant dispersed locations. One current complaint is that the facility ambulance is too often used for transporting doctors, for VIP roles and for movement of stores. Instead of seeing these legitimate uses as problems, the public sector facility ambulance could be appropriately

designed to play a multi-purpose function and act as a backup ERS. But for this it needs to be incorporated in the communication links and in the training and HR development process.

- What about care at the hospital? This is one of the weakest links of the chain. There are two issues here, availability of quality care and the cashless nature of service. The choice of hospital to which a patient is transferred assumes great significance. Presently the choice is based on proximity of the hospital from the site where the patient is picked-up by the ambulance and within this range the choice as expressed by the patient or attendant. Only those hospitals that are listed/contracted with EMRI and are posted on their GIS software are considered. But there is also a need to have matching investment in strengthening the quality of emergency medical services (as different from emergency response services) at the hospital. Public investment in this crucial aspect is however not as visible as is the investment made in 108 services, and there is a need to ensure a verifiable strengthening of the emergency care aspect too. We know that both Andhra and Rajasthan are struggling to achieve their minimum goals of emergency obstetric care providers. If 20% to 40% are trauma cases, what is the quality of trauma care available? Are there enough orthopaedics available? Are the priorities so skewed that we would continue to increase investment in transporting patients to hospitals while not increasing investment in the provision of care in the hospital? Or do we see this as an opportunity, where the increased pressure on the public health facility due to ERS, forces the state to spend more on care at the health facility level. Could EMRI be asked to play a bigger part in gearing up emergency management in the public health facility, especially in some areas like in trauma care.
- Equity Issues in Utilisation - Cashless service: One of the key features that ensures utilization is the cashless nature of service. Irrespective of economic status of the user there are no user-fees. Though there is a lot of discomfort with this, there are also powerful reasons to support it. Firstly, user-fees have been found to be exclusionary, especially for the poor and marginalized. Secondly, targeted systems seldom reach the poor or the poorest and universal access systems have better chance of doing so. This is a point that is controversial, for the reverse has also been argued; but if we add in the fact that there is a clear process of defining a family as BPL and reaching that entitlement to the correct family, there would be a larger consensus on this opinion. Thirdly, in a framework of right to health, the right to emergency medical care is one of the most basic of rights and a large public investment in this would be justified, even while reminding ourselves that that ERS (Emergency Response Service) is only a part of EMS (Emergency Medical Service) and one needs larger investment in all of EMS, and not only in the ERS component.
- Equity issues in utilization: However free service alone does not ensure access to the poor. Geographic distances, social barriers and perceptions, levels of awareness and information with the public, outreach activities, inability to incur the associated out-of-

pocket expenses etc. will all limit access to the poor. If a disproportionate share of the services is going to urban, centrally placed, economically better off, middle class section, the case for increasing state financing without additional alternative sources of financing, would become weaker. There is a need to monitor what is happening and there are simply no structures in place to do so. There is a need for systematizing concurrent evaluation processes. The choice of provider for emergency medical care can also make or break, even a middle class family without any insurance coverage. It could significantly shift resources to the emergency medical care providers who get the larger share of referrals where there is insurance or patients making more payments, make the choice. There is alertness in EMRI to these problems, and any conflict of interests or informal tie ups that are noted, are strictly dealt with. However there is no positive strategy of addressing these equity related issues. The government needs to independently monitor these aspects as well as articulate a strategy to manage these issues.

2. Costing of EMRI Services:

1. Capital Costs: These work out to approximately Rs 11 lacs per ambulance. In all the three projects the costs are high in the first year. It was Rs 21 lacs per ambulance in Andhra, Rs 28.27 lakhs in Gujarat and Rs 34.06 lakhs in Rajasthan. This higher first year costs is because the costs of building, administration office , software, call center costs that are incurred in the first year, when all ambulances are not in place. By the second year, these costs do not rise further but the number of ambulances increases. The increasing first year capital cost across the three states represents rising non-ambulance capital costs as compared to the lower costs of procuring and fitting ambulances.
2. The study does not have the information needed to comment on whether more economies could have been made on these capital costs, or whether these are optimal costs. However, clearly the project is itself in a learning curve as the rates being negotiated for each ambulance is improving. On the other hand the merits of the rising costs of building and the requirements of so much land are not clear. It has been argued by administrators that the space required for a call center operation with some administration space would have sufficed. EMRI's position is that some 120,000 sq ft of built up area is required- for administration, call center and training space. Any additional area though desirable for developing the place with gardens and so on, is not essential.
3. The operating cost per trip is also varying across states and over the years. Thus for the year 2008, in Andhra Pradesh it is Rs 565, in Gujarat it is Rs 635 and in Rajasthan it is about Rs 2700. Rajasthan's higher costs could be explained as higher first year costs, as the Gujarat EMRI also had a cost of Rs. 2872 per trip, in the first year. It obviously takes time for the news to get around, and the demands for services to emerge. However, it is also seen that after a point rising demand or increased number of

ambulances does not lead to same rate of decline in costs per trip. Thus in Gujarat, with an average of 4.31 trips per day and 402 ambulances, it costs Rs. 635 per trip while Andhra Pradesh with 652 ambulances and 8.1 trips per ambulance, it costs Rs 565 per trip – for almost the same average distance of 29 to 30 km per trip.

4. Cost per ambulance per year, in contrast to cost per ambulance per trip, continues to rise with number of years of utilization and increased frequency of use. There are also wide variances across states. Thus, it is Rs 6.68 lakhs per year in Gujarat at an average of 4.31 trips, but it rises to Rs 12.59 lakhs per year in Andhra Pradesh with double the average number of trips per ambulance of 8.1.
5. As utilization increases and the more trips each ambulance makes, the higher these costs would be. Today Andhra is reaching 8 trips per ambulance per day with one ambulance per 1.23 lakh population at Rs 565 per ambulance trip or Rs 16.5 lakhs per ambulance per year and for 652 ambulances the current year's expenditure is 107 crores. If this were to increase to two ambulances per one lakh population, i.e 1600 ambulances for the state and 11 trips per day per ambulance and also assume that average cost per trip were to stabilise at a lower Rs 475 per trip (estimate on optimum efficiency) then the costs would plateau at about Rs 305 crores at current rates and without adjusting for the increased costs of low population density in high dispersion areas. Thus in Andhra Pradesh, in the third year of operation, when 30% of all emergencies are estimated as being picked up by the ERS, the expenditure on ERS is currently about Rs 13.4 crores spent per crore of population per year. This could rise and finally plateau at about Rs 38 crores expenditure per crore of population per year for the provision of universal ERS. (One could use these two sets of figures for casting all-India estimates as well as projections for each state).
6. In Rajasthan however the per ambulance per year costs are very high (Rs 12 crores), even at very low utilisation, because the salary costs and the administrative costs make up the major part of the costs. Even in Gujarat, the first year of use had the same pattern.
7. The break-up of costs also shows varying patterns that needs further explanation. Thus, in Andhra Pradesh the administrative overheads costs are 31.37 % of the total operating cost, and the direct cost of running and maintaining the ambulances are 41.33% of the operating cost. The remainder of 27.30% is made up of salaries of the service providers (EMT, ambulance driver and call operator). In Gujarat the administrative overheads are 27.26% and the direct costs of operating the ambulances are 30.85% of the total operating cost and service provider salaries are 41.89%. In Rajasthan, the administration component is 38.32% while the ambulance component is even less at only 15.17% and the salaries of service providers is 41.89%. The ratio between running costs and the salaries of service providers correlates with average trips made per ambulance. As the number of trips rises the ratio falls - from about 1: 2.8 in Rajasthan to about 1: 1.35 in Gujarat to less than 1.5: 1 in Andhra Pradesh. The administrative

costs, which include supervision costs, remains steady, probably stabilising at about 30 to 35%. Gujarat is lower than this norm, but that is explained by the Gujarat CEO as transient, due to all supervisors not yet being put in place. Rajasthan is higher but that is explained by inter-state transfers.

8. The high levels of salary that have been called “corporate salaries” in discussions, are one obvious area to look for cost reduction. However none of these salaries have been included in the costs. The Rajasthan audit report highlights some other areas of possible administrative cost reduction.
9. Inter-state transfers, especially from Rajasthan’s fund to the funds in Goa and Andhra Pradesh, are one reason why Rajasthan has relatively higher administrative costs. The reasons for this are the liquidity problems in other states and due to the need for interest payments, and leadership costs being incurred at Hyderabad. These transfers (from EMRI Rajasthan and from some other state as well) were done without prior permission by diverting funds advanced for other purposes and were subsequently stopped.

Discussion:

Read together with the earlier part, the main conclusions would be:

- While cost per trip would come down with increased utilisation, after a point, there would be no further decline. Going by the classical theories of production and cost functions, after reaching a low, this unit cost is expected to rise with further increase in utilization and number of emergency cases. This is something that needs to be tracked and a business model has to account for this in the long-term.
- The preliminary impression is that operational costs could be further reduced even at current levels of utilization with substantial reductions in administration costs in some of the states.
- Even if the system stabilizes at a lower cost per trip, the cost per ambulance per year would continue to rise exponentially for reasons of increasing utilization explained in the earlier section. With a few follow up studies one should be able to model the costs of increased demand and increased utilization that could be expected realistically.
- The capital replacement cost, which is expected to arise every four years for each of the ambulances, will also add to the cost of ambulance per year. Thus if the operational cost is Rs 12 lakhs per ambulance per year and the capital costs per ambulance was about Rs 12 lakhs, then the annualised total costs would be about Rs 15 lakhs per ambulance – which would be a reasonable estimate for the costs of this service at current levels of utilization. But the likelihood of utilisation to go up much further or plateau at this level can be commented upon only after the second phase of this study.

3. The Financing of EMRI:

- a. Currently 100% of the capital costs in all states except in Andhra Pradesh are being provided by the government. In Andhra Pradesh alone the capital costs, excluding the costs of the ambulances, are to be provided by EMRI. For ambulances, the cost of the first 70 ambulances was contributed by Shri.R. Raju, the then CEO of Satyam and this was in 2005 -07. When it was expanded with 400 ambulances from the government the costs of these ambulances, but no other capital costs were borne by the government.
- b. The costs of the call center in EMRI's Andhra headquarters and the expansions made in it, the cost of the training institution and the training programmes developed and the technology development are all EMRI's contribution. The 40 crores taken as loan and overdraft in 2006-07 went towards this expenditure. There is the burden of a huge interest payment on this count. In the last board meeting held under Shri Raju's chairpersonship in October 2008²³, a fund of Rs 36 crores was promised to meet the capital expenditure and the leadership costs of the national headquarters and Andhra operation. This did not come through and this is the main source of the current crisis. Funds were drawn from the state grants towards meeting these commitments, but facing objections from the state, this was stopped. The national headquarters could not pay back these borrowing, leaving therefore a liquidity crisis in the states. Also it could not pay back to its creditors here or have advances for continuing its national headquarters functions.
- c. Of the operating costs, 95% were to be borne by the government and the remaining 5% of operational costs were to be borne by EMRI. It has been clarified that such a contribution has *not* been made in any of the states. Further that it would no longer be possible to make this contribution- even in a best case scenario. The audited statements of expenditure and income statements of Gujarat showed 5% as being borne by EMRI, but even this was explained as an error in the way it has been booked. Thus 100% of capital costs and operational costs are borne by the government.
- d. All of this government expenditure, whether capital or operational is from the central government - through the NRHM flexible pool. However from this year (2009-10) onwards, there has been a notification that henceforth, in the first year the state would have to bear 40% of operational costs, 60% in the second year, 80% in the third year, and 100% subsequently.
- e. EMRI however states that there is a sum of approximately Rs 36 crore per year that their national operation has to bear. These it calls leadership costs and this covers five activities- leadership, technology, research, national training and innovation. Most of this cost is in the form of salaries for human resources and national administrative infrastructure and functioning. These funds were committed by Shri Raju and other

²³ See Annex A-23: Minutes of Governing Board meeting of EMRI – 20th October 2008.

members of the society but even when they are unable to meet these commitments, EMRI would prefer to raise these funds from private sponsors. The CEO reports that a number of parties are positive about supporting these central leadership costs but these sponsors would not be able to meet the 5% of operational costs- which incidentally would be about the same amount or less. Part of the reason why the EMRI leadership would prefer to source these leadership costs from outside the government, is to retain their flexibility and autonomy in decision making where it relates to terms and conditions and work allocations of this national leadership component- even in a situation where all the rest is under a government led board.

- f. There are no user fees for any category of users. Though by itself this is desirable for a public health service, especially for an ERS, there are two problems that would result. One is the sustainability if utilization continues to rise exponentially, and more and more ambulances become necessary. And secondly, checks on over-consumption (what is referred to in insurance industry as 'moral hazard') of the service.
- g. The travel costs of pregnant women are potentially recoverable substantially from the Janini Suraksha Yojana (JSY) allocations. However JSY allocation is not meant for all and many categories are absent in the high performing states. To that extent it would not be recoverable. However JSY may be seen as one source of funding, although, that is also central government funds flowing from the same pool and these funds are already committed by the central government.
- h. One of the most remarkable features of the financing plan is that there is really no plan. The text in the MOUs as regards costs and business plans has no relevance at all to actual financing. The exact manner of financing the costs is for the government to pay a large sum (generally, 25% of the annual contract value) as advance and then after a time period (mostly, monthly), EMRI presents a SOE/ utilisation certificate and then takes the next advance. The utilisation certificate merely states what it has spent on, in the broadest terms - so much on salaries, so much on fuel, etc. It is up to EMRI to declare how many trips it has made and how much it has spent on them. There are no ceilings nor any minimum levels nor any targets. Indeed it does not even declare the trips it has made, though it sends a daily sheet of ambulance trips from which the government could estimate the payment to be made- which no government has ever been able to do. Governments have no idea about the staff strengths deployed, or even what funds are committed or unit costs permissible per ambulance or per kilometre travelled etc. The EMRI thus has a commitment from the government that it can spend whatever it takes on operational costs and even on capital costs, and this would be paid for in advance. This is not spend and reimbursement arrangement- but advance payment arrangement.
- i. Operating costs are currently approximately Rs 15 to Rs 17 lakhs per ambulance per year (including an annualised replacement cost of approx. Rs. 3 to 5 lakhs per year). These costs could be expected to rise further. Thus the currently estimated Rs.

1700 crores required per year for a projected fleet of 10,000 ambulances needed nationwide (accounting for around one ambulance per lakh population) could finally be two to three times this amount. Sustainability would thus become a major issue.

- j. However Rs 1700 crores per year needed for nationwide coverage is only around 10% of current NRHM annual budget and would be only about 3% of the promised Rs 55,000 crore per year that was projected as the level of public expenditure on NRHM that was to be reached by 2012. Even if we take a higher level of utilisation, then it would be about 5% of the NRHM budget. In a scenario where the commitment to raise health care expenditure to 3% of the GDP is adhered to, this Rs 1700 to Rs 3000 crores commitment would help reach this goal. On the other hand if the cost spent on health care provision does not rise as it should, this outlay would be too high and unsustainable.

4. Governance and Management:

- a. The EMRI has been procured as a single agency in most states without a tendering process. Whereas in Andhra, in the early phase this was a partnership with Satyam bringing in investment, subsequently the project became 100% government funded capex and 95% government funded opex. With even this small 5% not turning up, it is now a 100% government funded opex.
- b. Most of the MOUs have the provision of declaring it a monopoly provider. This is also not an essential feature for success. Potentially one could have a system of multiple ownership of ambulances, with a single call center (like the call taxi systems), or a mix of public or private or even more than one provider in a state. Of course regulation would be essential for efficiency so that there is only one operator for a given area. However to the extent that by virtue of 100% ownership EMRI would need to increasingly abide by government financial regulations and soon face all the attendant HR issues as well, one may well rethink even this aspect of it.
- c. Procurement of ambulances and their fabrication have been two separate contracts and tendering process- the first costing about Rs 5 to 6 lakhs per ambulance and the fabrication costing about Rs 3 lakhs per ambulance and then the equipment costs. Procurement processes followed have followed government preferences. In Andhra the government tendering process was followed, with the government doing the tendering for the vehicle and the EMRI tendering the fabrication component. There was joint committee that conducted both procurements and payment was through EMRI. In Gujarat the first 75 vehicles were as per Andhra Pradesh's tender but subsequently, the rest was by government tendering process with a joint tendering committee composed of equal number of government and EMRI representatives. This same process was used in Rajasthan. There are states like Uttarakhand that left it to EMRI and even some that did

it fully on their own - though the latter was cancelled. In Rajasthan the cost per ambulance came down to Rs 5.3 lakhs with fabrication costs at Rs 2.8 lakhs.

- d. One of the management challenges and achievements of EMRI has been its HR planning and management. Each ambulance has 3 pilots (drivers) and three EMTs who work in pairs of two for every 12 hour shift with a break every fourth day. For every 15 ambulances there is one operation executive and one fleet executive- both supervisors, the first of the care given and the second a diploma in automotive engineering, provided for vehicle support. Above them there is one district manager, and one administrative officer for every district. There is a small advance of Rs 500 given to every ambulance, Rs 5000 given to every operation executive and Rs 12,000 to every fleet executive. At the call center there are approximately 500 calls handled per call officer and 100 despatches per despatch officer. On every 20 Cos/Dos there is a supervising team leader and for every four such team leaders there is a manager. In the state of Gujarat for example there are 2300 ambulance level staff and some 150 supervisory and management staff.

Table 3: EMRI staffing across states (as on 28 Feb 09)

	Andhra	Gujarat	Rajasthan	National (at headquarter)	All India (10 states)
Operational staff	5053	2107	687	22	12035
supervisors	202	69	48	17	547
Mid-managers	55	11	17	28	153
managers	17	4	5	9	52
Leadership 1	1	3	1	4	12
Leadership 2	5	5	3	12	34
Leadership 3	1	1	1	9	16
Leadership 4	1			3+1	5+1

Source: Annex A-22 (State wise Head Count of EMRI – as on 28th February 2009)

- e. This impressive staff strength and this ideal pyramid of supervisory staff to manage the staff would be the envy of every programme manager in the health system. It is to the credit of the EMRI that it could put in place such a structure. It is unlikely that any other programme, especially if done within the government would have been allowed this. And yet this adequacy in the supervisory structure is essential to this schemes success. When costs are lowered through a tendering process, or there is a rationalisation of costs that is attempted, it is precisely this part that may get axed, and that would *not* be good for the outcomes.

- f. Salary structures have been a matter of discussion. The operational staff are the pilots, the EMT (paramedical staff), and the call operators. At the levels of paramedical workers, one concern has been that the higher salaries may be leading to shifting of human resources within the states, leading to further pressure on public sector posts. However the need for higher skill levels, work schedule of 12-hour a day (half of which are as night duties), and a more intensive nature of work are sufficient reasons for the higher payment. The EMT (emergency medical technician), a graduate, gets 1.00 lakhs per year or about Rs. 8000 per month and the driver - about Rs.0.75 lakhs per year or Rs. 6000 per month. Their immediate supervisors are the operations executive and the fleet executive and they would get monthly Rs. 18,000 to Rs. 25,000 monthly. The district level managers get about Rs. 40,000 per month. The state level managers would command about Rs 6. lakhs per year – and all this is as cost to company. This much is part of what is now shown as operational costs. The audit report of Rajasthan indicates that policies in pay fixation for middle level managers are sub-optimal leading to wage jumps for new recruits at higher and middle level management levels, but this is difficult to comment on and anyway relates to very few posts. Though such structures could be examined for further economies, most of it is likely to remain.
- g. During discussions it was explained that in addition to the above mentioned operational staff levels, there are four levels of leadership, what EMRI refers to as the leadership levels. Of these there is a total of 200 staff, of which 100 at the national level and about another 100 at the rate of about 10 per state. We were told by the EMRI officials that for these leadership levels, the annual salary ranges from Rs.12 lakhs for the lowest in this group to Rs.36 lakhs for the state head of operations, averaging at Rs 18 lakhs per year. This comes to a recurrent bill of Rs 36 crores per year that no one is paying for currently and for which EMRI intends to find independent sources. There was an understanding amongst some stakeholders that this could be seen as the 5% operational contribution that EMRI makes - but EMRI specifically denied this and asked for this “leadership costs” to be seen as over and above the 5% “operational costs contribution”. The latter, EMRI is anyway not in a position to pay. Even if these salary amounts are taken as justifiable and necessary there would be the question whether 200 persons at this scale of pay are merited. It is precisely this sort of question that gets avoided if this is considered as “leadership costs” as separate from the 5% “operational cost”, and as somehow happening within a separate EMRI space. It follows that these leadership costs cannot be billed to the government. This accounts for at least much of the borrowings from the states. We further note that EMRI states that these leadership salaries have not been paid for the last three months and would be paid only if a corporate sponsor is found. Could it be billed to the government? Perhaps if these were pegged to some standards - for example, the best executive salaries in public sector undertakings with all their benefits monetized – and if the absolute number of such posts could be rationalised, governments could be asked to pick up these costs- but clearly for

EMRI this is the last option²⁴. The autonomy gained and the partnership element introduced by keeping this leadership payment outside the bill presented to the government is preferred to taking it from the government, and thereby becoming government employees.

- h. One of the central problems faced by the government is insufficient transparency. There is no member from the government on the board or the executive committees to ensure this transparency or even basic consultation with government on decisions that affect it. To give an example: EMRI-Rajasthan made a substantial transfer of funds to other states. This was from an advance that the state government had made to it for the Rajasthan operations and ambulance purchases. EMRI then came back to the government requiring an immediate release of a further instalment to continue operations. This could not be denied because the alternative was imminent closure and a resulting public outcry. The state is thus in a position of having to comply under threat without being able to exert minimum controls. The state asked for and could not even get the balance sheet to evidence the claim that funds had really dried up. EMRI on the other hand maintains a single national accounting system and does not feel compelled to share the entire national accounts with each state. In Andhra Pradesh term loan facility and over draft facility from Axis Bank have been used the extent of Rs 22.73 crores and Rs 20.38 crores respectively. This was done in an earlier period and was sanctioned against all current assets and movable fixed assets including land and buildings and personal guarantee of the chairman of the Institute - Shri Ramalinga Raju. At the time of taking the loan only the Andhra operations were on, and therefore it needed no permission from any state. But today to meet the interest payments of this loan and to pay for the leadership costs estimated at about Rs 36 crores per year, it would need to draw on the advances from the states. If it gets a corporate donation it could repay these costs. If not there would be a crisis. These infarctions may be only reflective of the current liquidity crunch and not a regular feature, but the point is that there is just no system in place for government to know, and to independently satisfy itself about the way such large investments are being managed. And unless there is a major change in the MOUs, the states can never know. Trust alone may not be counted as a system of business when such large sums are concerned.
- i. Another central problem is the lack of an independent monitoring system which can validate the data given to it by EMRI. There is no “contracts management cell” in the state government side and the secretary or mission director deals with it directly. The data provided by the EMRI is the basis of all decision making and this data is taken on trust. Even where there is no specific reason for disbelief, any public private partnership, especially one which involves corporate entities, and those which involve transfers of large public investments into private hands, must put in place a system of routine

²⁴ We note that all the numbers in the leadership category do not match the table - 3 given above and this would need further clarification

validation of data. This is all the more essential in this type of operation where payments would be exclusively linked to the reported statements of use. Independent monitoring is also necessary to ensure that there is no skimming for better cases, for ensuring equity concerns related to access (urban-rural, BPL-APL), which may occur even in a cashless service due to various reasons. Independent monitoring is also essential to ensure that there are no local arrangements starting up between a limited number of private providers, with a skimming of higher income patient groups and more hospitalization cases going to certain hospitals. None of this has been alleged, but even then when the net transaction is in crores such basic monitoring arrangements are mandatory.

- j. Each state has a separate bank account to run the EMRI in that state- but they are all part of the same registered society and under the same board with headquarters at Hyderabad. There are no state level branches or trusts. The registered society is made of 17 members all largely members of the family of Shri.R. Raju. A board was constituted, with 12 members to govern the EMRI operations and this was chaired by Shri Ramalinga Raju. After the collapse of Satyam most members including the chairperson resigned and today there are only five members- Shri Rajiv Reddy, Rajat Gupta, Jayaprakash Narayan, Krishna Raju and the CEO, Venkat Changavalli. The board was quite functional till October 2008, when it met quarterly without fail. The chairperson actively reviewed and guided the functioning of EMRI. But since then the board is whittled down and is non functional and needs to be reconstituted. The post of chairperson of the board is also vacant and there is no mechanism of filling it up. We assume that this has been hitherto a decision of the members of the registered society- but with one or more of those members facing criminal charges related to financial fraud an alternative and more acceptable way of deciding the chairperson has to be found. There is a need therefore to recast the governance of this structure, since there is considerable stake that the government has in its continuing to play an effective role. The existing board has formally conveyed that it is willing to act by the governments mandate and it is now for the government to make its recommendations to the board.
- k. The members of the registered society are said to have brought in Rs 34 crores when it was formed. It was with this amount that EMRI funded the first 70 ambulances and agreed to pay 50% of the operating costs in Andhra for the first year. This sum of Rs 34 crores was used up in the first years. Then EMRI raised Rs 40 crores as loans for further investments for its offices and training complex at Hyderabad and to meet leadership costs. The board under Shri Raju had promised a further 108 crores, which would have paid back the loan and taken care of the leadership costs, but this is now ruled out. The effort of the CEO is to find sponsors who would be willing to bring in capital to repay the loans and meet the leadership costs and allow such a sponsor to take over the society, whereby, either a number of persons bringing in Rs 2 crores each or one large sponsor brings in 40 to 50 crores. But while searching for new sponsors, EMRI needs to avoid large hospital chains which would have a potential conflict of interests. Potentially a large

hospital chain would be more interested in drawing patients into their underutilised hospital capacity than providing an universal ERS. The funds/sponsors would also need to have legitimate and reputable sources. The new sponsors would need to deal with Satyam whose name still appears on every ambulance as technology sponsor and persuade Satyam to part with the technology and the intellectual property rights over it. And finally new sponsors would have to be able to ensure that current society members are all phased out without further costs and trouble. Clearly achieving all this is a large order, but the CEO and his team seemed to be cautiously optimistic of being able to do all this and that too within a month or two.

- l. How does one define the relationship between the government and the EMRI? If the definition of partnership is a relationship where both partners share in the resources, rewards and risks, this would not qualify as partnership. EMRI has brought in no financial or material resources after the pilot stage. EMRI bears no risks. Whatever be the efficiency, the government is committed to paying for it. It has a limited share of the benefits in that it provides high value employment to its key personnel, though perhaps it has considerable social contribution and social recognition, and these were their greater source of inspiration. However it could be argued that the intellectual resources of these key personnel are of a very high order and this alone would merit such an arrangement. In essence, rather than being a partnership, it is now more of a management contract given to a not for profit body constituted purely for this single purpose.
- m. There is however no doubt that what exists as management processes and management competence are of a high order. The organisation of these services and its massive expansion across the states, achieved in a very short time is a major achievement. Processes by which calls are received, processed and acted upon aided by GIS based software are fine tuned to a high level of precision. The system of monitoring including a voice recording of every single one of the tens of thousands of calls received daily and the documentation trail of every single step which allows a 100% recall and analysis of every process for quality, efficiency and effectiveness - both at the level of programme management and for redressal of every single grievance is truly impressive. There is justifiable pride in the professionalism and excellence in the design and operational management of the programme. It would be difficult to reinvent all this. Though it is not impossible to do so, the effort of bringing together a professional team with the sort of liberal funding and blank cheques that EMRI has been allowed and which is invaluable or such experimentation would seldom be available again in the government system. The EMRI team is proud of its achievement. It can scarcely conceal its dismissive assessment of even the possibility of anyone else being able to replicate this level of management excellence. To make this point they invested time in showing the evaluation team the details of the 72 odd processes that have to be monitored and reacted to on a daily basis to make the system work. This was truly impressive. Moreover, the team felt that it should also be unnecessary to lose this intellectual capital

and start from scratch, as every new service provider beginning work in this area would have to do. However, how does one go forward with such a single vendor contract if EMRI is an independent private agency?

- n. If it is a management contract one option is to make it a government operation and contract this same team to expand this scheme to all states on an agreed to structure. It would thus become a public sector undertaking with some protection of the salaries of the top 100 and with adequate safeguards for management autonomy. As long as the professional contribution is respected and the current take home salaries of the top 100 are protected there may be no resistance and even a cautious welcome to this move. If this is not sustainable, would it be possible for government to see the EMRI as a turn-key PPP which builds, operates and transfers (BOT) the ERS?
- o. To examine the options of governance of this management contract:
 - i. **Option 1.0** :Government retains EMRI as a private agency, and does not bail it out of its current crisis and lets it find its own sources to meet leadership costs and pay back liabilities:

Questions:

- 1. Would EMRI be able to survive, pay back its loans and regain its liquidity without being bailed out by a substantial government infusion of funds? If EMRI is unable to pay its creditors and honour its commitments and goes under- would it not disrupt a potentially great programme leaving behind a financial and operational mess? What are the chances of it being able to find such a sponsor?
 - 2. If EMRI is able to survive due to a bail out by corporate sponsors and is reinforced as a separate private entity would the government not lose the ability to use this institution further to develop ERS across the country as it has done now? In that case EMRI would have to enter the competitive bidding process, and then it would have to cut costs and cannot direct innovation in the way it is doing now. Such innovation may have more room if it were a public sector entity.
 - 3. If further selection and renewals of contract are through the tendering process, those awarded the contract through tendering may not perform as well. For it takes investment to build up intellectual capital and this would not be provided for. This may over time prove EMRI superior by a more open process - but still time and focus would be lost and there would be many failures of others and many restrictions on EMRI operations which they may not be
- ii. **Option 2.0**: The government provides the funds to bail it out: (this could be done on its own or it could use development partner contribution)

Questions:

- 1. Would government not have to strengthen governance by increased public participation and would it also not have to rationalise leadership costs- this would make it more like an autonomous public sector entity. It may be impossible for government to take on the current liabilities and the

- future leadership costs of EMRI (a non recurrent 40 crores and a recurrent 36 crores annually) without such a restructuring of governance.
2. If the government does take a greater role in governance, would it not face the risk of finding much of the leadership of EMRI anyway leaving it. Government could then get stuck with a public sector undertaking that it cannot handle and that it cannot abandon.
 3. Would government be able to negotiate a planned transfer of technology and skills to an agreed upon and negotiated more sustainable institutional structure? This would critically depend on whether it is able to take the current leadership along in this transformation of the EMRI. This also means protecting the leadership costs. Government may take on itself the commitment to help EMRI find funding sources/contributions for such costs or make it available from its own funds for a three year period in return for such a planned transfer of technology and skills and some continued professional support thereafter.

V. Recommendations:

(a) Governance and Management:

1. Even as the appraisal of EMRI was being undertaken, the earlier chief promoter of EMRI M/s Satyam Computers, is under investigation for serious frauds. The Satyam crisis has affected EMRI's executive board structure, seriously affecting their corporate governance, credit worthiness and liquidity. Thus there is an urgent need to bring considerable transparency into board operations at EMRI Hyderabad. The most important reform in this direction we suggest that at the national level, EMRI board should be headed by a chairperson nominated by the Secretary, MOHFW or Mission Director, NRHM. Two state mission directors or principal secretaries by rotation taken from the states with over Rs.50 crores funding to the EMRI be also taken on the board.
2. The legal entity of the EMRI registered society be separated from the board operationalising ERS by creating a sector 25 company called the EMRI- ERS company, and the board described earlier be the company board. A total of 13 board members would be agreed upon by discussions between the current CEO of the company (or current EMRI board members), the NRHM represented by the secretary and the chairperson of the board, and the main states which have ongoing MOUs with EMRI. The current five members on the board may continue for its first term or may be changed- depending on the discussions.
3. To enable transition, the registered society could be allowed to nominate two more names on the board while other board members would be decided by consensus between the chair person of the board and its member secretary who is the current CEO of this company. Once the sector 25 company is formed and the board holds its first meeting the board can decide and renegotiate the relationship between the board and

the registered society. If agreed upon by both, this relationship can be ended. The need and way to reconstitute the registered society is not gone into here as it is a private body which may take its own decision in this regard. However it would seek clarity and renegotiation of the relationship between the society and the board.

4. The central government would also provide this newly formed company with the funds to become solvent again, clear its dues and function as a management contract to administer and guide the formation of ERS in all the states.
5. If the national board is government led, then the state level sector 25 companies may not be needed at all and a state specific steering and monitoring committee with specified powers may be adequate. If on the other hand the government chooses to prefer separate state bodies, then at state levels there could also be sector 25 companies who are independent legal entities with the state secretary as chairperson and the board members nominated by the national board in consultation with the state secretary of health. Each state board would be a separate legal and financial entity with its own board and executive and CEO. Any interstate transfers of funds and transfer of funds to other institutions or taking loans and overdrafts would need approval by the reconstituted Governing Board. This is needed to totally ring fence EMRI from Satyam accounts and the accounts of Mr Raju and family. Individual State accounts should also be so ring-fenced.
6. The national and (if created) state EMRI boards should also have a vice chairpersons, who would be persons with business management experience and a good record of leading or playing a governance role in corporate social responsibility organizations whose name is agreed upon by consensus by the service-provider, the state secretary of health and the national mission director of NRHM. This vice chairperson should be able to provide some time to this work as expected, as independent director of a corporate board, and a person of integrity who can provide counsel to both the secretary and the CEO and the national mission director in case of problems, and help find space for facilitating desirable corporate practices. This would also ensure regularity of the quarterly meetings if the secretary is not able to make it for some meetings.
7. The nominee of the state secretary or mission director shall be considered a special invitee to all internal review processes of the EMRI at state level
8. A set of documents would be defined which would be used for recording and reporting data and soft copies of these would be regularly provided to the government. These records would be maintained by the EMRI and be available for routine mandatory sample monitoring checks by the contract management cell under the state health mission. These would include trip sheets of the ambulance, the details of call received and the ambulance dispatches. The exact details of this would be finalized after part II of the study is completed.

9. The cash books and ledger books would also be available for review on any day. The bank balance statement for each month would be filed with the contract management cell.
10. Each state would have a five member contract management cell who are full time and carry out the mandatory concurrent financial and physical evaluation on an agreed to format and on a sample basis. The NRHM would pay for this. This could be built into the PPP management cell and located in SHRCs or directly in SPMUs.
11. The presentation of the utilisation certificate for the next instalment should be systematised, so that the exact number of trips made, kilometres covered and services delivered are also seen as well as component costs by category of expenditure. All procurement may be mandatorily by joint committees following government rules and the open tendering route where the value is above Rs 25 lakhs. Payments made for procurement may be done directly or routed through EMRI- but should not be interchangeable with other heads of expenditure.
12. If EMRI is not made into a government led sector 25 company, then the exclusivity clause of EMRI should be removed.
13. There is space for states to consider alternate models, for example the call center is central but ambulance providers are different.
14. There is in particular no case for requiring 25 acres of land for this project. A certain minimum built up space on rent or purchased for its administration, call center operations and for its in house training may be all that is required.
15. No further state should offer contracts to EMRI- if it is a completely private agency - or any other ERS provider without a due tendering process. A clear guideline on this should be issued, along with tool kits including model RFPs to help in this process. Technical assistance for this should also be provided. Some provisions of this RFP and the ideal MOU would be considered mandatory to qualify for central funding.
16. This appraisal itself would continue into a second part which would examine the validity of data, and recommend on monitoring mechanisms. Further the second part of the study would examine HR, quality of care, and equity of access issues and opine on these also.
17. All the reports and conclusions of this study are now based on the data submitted by EMRI. In the atmosphere of doubt created by the crisis in trust of its chief sponsor, there is a need to undertake a basic sample study based validation of the basic data parameters, on which all these recommendations are made. This would be of use to EMRI also and its well wishers to argue the case for continued support and need not be perceived as contestation of their data. Further we also note that any PPP framework requires that there is in place an independent monitoring mechanism for cost, quality and access. For this reason also this study must lead onto its second part and this must be followed by putting in place reliable monitoring and accountability mechanisms.

(b) Financing:

1. The government of India has already indicated that the state would have to share in the operational costs. This is pitched initially at 40% and then would rise to 60% and subsequently 80%. Once the central and state governments are able to assure itself of adequate transparency in governance and efficiency in operation, and improved effectiveness by strengthening other aspects of EMS, there is a case for revisiting this guideline and instead arguing for a state contribution of 50%. The aim is to encourage states to go down this route to higher public expenditures in health and not shy away from this altogether.
2. If NRHM fund allocation matches the stated goal of reaching 3% of the GDP, and rises to about Rs 55,000 crores per year, the resources for a universal ERS can be found and absorbed. However if NRHM allocations stagnate at the current Rs 12,000 crores the space for such expansion would not become available.
3. As a general principle, user fees are not recommended, but above a particular level of consumption of this service and with monitoring mechanisms assuring equity of access, there may be a need to consider its introduction as a way of limiting wasteful consumption. Placing concurrent evaluation in place would help in planning this. But this is largely a problem of the future. At present the challenge is still of increasing utilization.
4. The impact of ERS by the EMRI route on the population level ratio of out-of-pocket expenditure to public health expenditure at the facility level of service provision also needs to be assessed.
5. ERS has to be perceived as an entitlement and service guarantee. There can be no going back on this. The National Health Bill if passed would also make this mandatory. The focus is really not on whether we need an ERS, but what form of operationalisation of ERS would be most efficient and most effective.

(c) Improving Efficiency:

1. A verifiable set of performance indicators that measure efficiency and effectiveness may be reported by EMRI on a routine (weekly/monthly basis) to the respective state governments, especially regarding the range and average of time taken to reach emergency, the area of coverage, the number of failed despatches, number of trips and distance travelled per day by all ambulances (separately), average up-time/down-time of ambulances and quality of care both in ERS and in the rest of EMS
2. Payments may be based on these performance indicators in addition to statements of expenditure. Indicators ranges should be specified as achievement norms and these would be related to density of ambulances deployed and optimum level of utilization at each stage of deployment aimed for.

3. If the leadership costs are to be borne by the government this should be rationalised on a negotiated basis, with some of it being borne by the center directly and the rest being shared with the states.
4. A national system of concurrent performance audit of EMRI operations in various states may be put in place by the MoHFW. This would supplement the five person contract management cell to be put in position in each state. The five person contract management cell would operationalise a system of validation of EMRI supplied data on a regular basis.

(d) Improving Effectiveness:

1. There needs to be independent monitoring of appropriate of response to the emergency call, the time in which patients were reached, the quality of stabilization care that was provided during transport. The current figures are provided by EMRI and they give the spirit of the enterprise but are more in the nature of promotional material. Quality data on these aspects needs to be assessed to provide some of the answers needed. This above dimension also needs to be viewed with the equity perspective, i.e. who are still not accessing this service and why. The second part of this study would attempt to address these issues. It would help arrive at estimating requirements for ERS and to plan for the future.
2. There is a need to strengthen the quality of the non ERS aspects of emergency medical care, namely care provided at the hospital. There is also a need to make it cashless at least for the poor and provide insurance cover or other mechanisms for the rest. The level of training of service providers and the equipment and infrastructure needed to provide emergency medical care needs to be enhanced at least commensurate with the investment being made into transport.
3. The protocols used for stabilisation care, for choice between facilities, for managing problems especially on payments at the facility level, for transfer of patients who are not accepted or who complete 24 hours without ability to pay or improvement in health, all need to be assessed.

VI. Conclusion

EMRI is undoubtedly a historic landmark in the provision of health care in the nation. To its credit goes the achievement of bringing Emergency medical response on to the agenda of the nation. Though not part of the original NRHM design, its tremendous popular appeal along with the flexibility of the NRHM design made it possible for it to emerge as one of the leading innovations of the NRHM period. The first common review mission of the NRHM had noted this as one of the two successful public private partnerships worth replicating. However, even then the need for a closer look at the costing and the contractual

arrangements and the need for independent monitoring had been recognized. The crisis of its promoter only hastened on a process of evaluation that was well underway. Today there is a situation that without central intervention into the governance of the EMRI, the whole system could collapse. Yet such intervention if poorly planned could create more problems than it would solve.

This evaluation seeks to build on the EMRI model of ERS, not replace it, and much less abandon it. The average cost of Rs 450²⁵ per ambulance trip, provided free to every emergency medical, police or fire needing help anywhere in the country, and that too within 20 to 40 minutes, is almost a dream, and it is a dream that is tantalizingly within our reach, not within a lifetime but within a plan period!! Rs 2000²⁶ crores to reach such a goal is steep but not impossible. It costs about as much as we spend on pulse polio today. The only danger in this stage is the danger of complacency and the abandonment of caution and basic systems of governance in a fit of populism and competitive promotion of what seems a certain winner. It is in this spirit of such caution mixed with a commitment to achieving universal ERS that these recommendations are made.

²⁵ This is assumed as ideal, looking at the present Rs. 600 per trip and accounting for some possibilities of cost reduction and economies

²⁶ This figure takes into account the annual operating cost of around Rs. 15 lakhs per ambulance, for 10,000 ambulances nation-wide and also building in some mark-up in light of additional ambulances that may be required and other contingencies

Annex – A

EMRI appraisal for the State of Andhra Pradesh: List of Documents

1. MOU between Government of Andhra Pradesh and EMRI entered on 21st July 2007.
2. PowerPoint Presentation of Management Analysis report of EMRI in Andhra Pradesh (January 2007).
3. PowerPoint Presentation of EMRI services in Andhra Pradesh (20th February 2009).
4. The latest periodic data (April to December 2008) for the period April 2008 to December 2008 given to commissioner of family welfare office.
5. Balance sheet for the year 2007-08 and Audited report as on 19-06-2008.
6. District wise consolidated ambulance performance report for the month of June 2008.
7. District wise consolidated ambulance performance report for the month of July 2008.
8. District wise consolidated ambulance performance report for the month of August 2008.
9. District wise consolidated ambulance performance report for the month of September 2008.
10. District wise consolidated ambulance performance report for the month of October 2008.
11. District wise consolidated ambulance performance report for the month of November 2008.
12. District wise consolidated ambulance performance report for the month of December 2008.
13. Statement of claim of quarterly advance of operational Expenditure for July to September of 2008-09 for 150 new ambulances and for October to December of 2008-09 for 652 ambulances.
14. Emergency call daily report for 05 September 2008.
15. Emergency call daily report for 03 November 2008.
16. National Performance Daily report for 02 February 2009.
17. National Performance Daily report for 15 February 2009.
18. National Performance Daily report for 17 February 2009.
19. Snapshot of EMRI operations as on January 2009.
20. Ambulance wise report of total distance covered for all districts of Andhra Pradesh for the month of September 08.
21. Ambulance wise report of total distance covered for all districts of Andhra Pradesh for the month of December 08.
22. State wise Head Count of EMRI – as on 28th February, 2009
23. Minutes of Governing Board meeting of EMRI – 20th October, 2008
24. Andhra Pradesh – Aailed Dispatches – January 2009
25. Andhra Pradesh's Emergency Market size
26. EMRI Pre-hospital Care Record (PCR) – 3 samples/copies

27. State wise Quality update – March 2009
28. EMRI hospital MOU & Survey
29. Orders issued for the additional 150 ambulances in Andhra Pradesh
30. Andhra Pradesh – 150 Ambulance Impact & 108 Coverage
31. National Performance Daily Report – 9th March 2009

Annex – G

EMRI appraisal for the State of Gujarat: List of Documents

1. Gujarat Emergency Medical Services Bill, 2007.
2. MOU between Government of Gujarat and EMRI entered on 21st July 2007.
3. Service agreement between Government of Gujarat and EMRI entered on 29th August 2007.
4. PowerPoint Presentation of EMRI services in Gujarat.
5. Audited quarterly utilization certificates and statement of expenses.(For quarter ending September 07 to quarter ending December 08)
6. Ambulance wise Emergency dataset provided by EMRI dated 14/01/09(Contains data for each ambulance for 2007 and 2008).
7. Emergency response centre daily report for Gujarat dated 31/12/2008(Cumulative figures for December 2008.).
8. Emergency response centre daily report for Gujarat dated 14/01/2009(Cumulative figures for January 1st to January 14th.)
9. Ambulance service performance for civil hospital gandhinagar and chiloda circle.
10. Gujarat ERS – Daily Report: 31/12/2008 (2nd copy)
11. Gujarat EMRI – Weighted Average Distance/ Trip (till Dec 2008)
12. Gujarat EMRI – Analysis for April-September 2008 (trips & cost per trip)
13. Gujarat EMRI Aailed Dispatches – January 2009

Annex – R

EMRI appraisal for the State of Rajasthan: List of Documents

1. MOU between Government of Rajasthan and EMRI entered on 23rd May 2008.
2. Comments given by NHSRC on MOU/Contract of EMRI Rajasthan.
3. Audit Report of EMRI Rajasthan for the three quarters ended on 31st December 2008.
4. Minutes of 2nd meeting of the Programme Management Committee of Emergency Medical Services Project.
5. Letter from EMRI to Mission Director Rajasthan regarding certificate for transfer of funds dated 16.02.2009.
6. Letter from EMRI to The Principal Health Secretary Rajasthan regarding freezing of EMRI bank accounts dated 13.01.2009.
7. Ambulance wise details of distance travelled per day dated 18th February 2009.
8. Daily call and dispatch report by type of emergency dated 18-02-2009.(Cumulative data for 18 days of February).
9. Rajasthan EMRI Daily Report: 12th March 2009-03-25
10. EMRI Rajasthan Statement of Expenses (SOE) – June 2008 to January 2009