## Appendix A

Table A.1: List of Research Papers found relevant for the objective of this study

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Appendix B: Sample Questionnaires

Questionnaire for All under Healthcare Environment

Automation in Health sector is enabling the care providers sharing the patient’s health data electronically. This sharing of health data enables quick access and decision making by the doctors thereby providing better healthcare services to the patients. Use of Technology in healthcare has drastically reduced the time required in transferring patient’s records from one remote location to another. The hospitals and clinics have adopted customized software applications to store patient’s data and refer it while providing healthcare to the patient. Accessing electronic health records (EHRs) over the network by various stakeholders that includes, doctors, paramedical staff, patients, IT people and others, expose them to various security threats and breaches. The need for effective IT security management in healthcare is made all the more urgent by the increasing use of wireless and internet technologies in healthcare delivery. If not implemented properly, these complex technologies will increase the risks to the confidentiality, integrity and availability of health information. A consistent approach to IT security, understandable by all involved in healthcare, will improve staff morale and increase the trust of the public in the systems that maintain personal health information.

The survey is conducted with an objective of identifying the security issues while sharing patient’s health data by doctors in integrated health environment i.e. when data is shared by various doctors in inter as well as intra hospital environment. It is required to further investigate how doctors decide on various levels of security for maintaining confidentiality and privacy of health records of their patients and accessing them from various locations.

Kindly give your opinions on various issues and scenarios existing in real-time hospital environment by filling this questionnaire.

PERSONAL DETAILS

Name: Pankaj Gokhale
Age: 31
Gender: M
Designation: Centre Head (IT)
Hospital: Kulkarni
Department: 
Mobile: 

1. How frequently do doctors or others change their passwords?
   Always      Quite Often     Sometimes     Rarely     Never

2. How frequently does doctors or others in healthcare services, share their passwords with colleagues?
   Always      Quite Often     Sometimes     Rarely     Never

3. Do you think that doctors and paramedical staff would gain additional access rights over the time due to frequent shift of duties from one department to another?
   Strongly Agree      Agree      Somewhat Agree      Disagree      Strongly Disagree

4. Do you think that every doctor of the hospital should have full access rights on any patient’s data?
   Always      Quite Often     Sometimes     Rarely     Never
5. Is your opinion, how much access is provided to experts and specialists who are called per-case basis?

- Complete Access
- Only Required Details
- Partial Access
- Read-Only copy of required details.

6. Do you think that doctors who visit on call should be given separate logins for ascertaining secured access to the electronic health records of the patients?

- Strongly Agree
- Agree
- Somewhat Agree
- Disagree
- Strongly Disagree

7. The doctor on call of more than one hospital can treat the patient at any location resulting in redundant and inconsistent storage of patient's health information. Give your opinion on it.

- Strongly Agree
- Agree
- Somewhat Agree
- Disagree
- Strongly Disagree

8. Do you think that patient should be given full control over his health data?

- Strongly Agree
- Agree
- Somewhat Agree
- Disagree
- Strongly Disagree

9. What security measures are used in your hospital to identify the patients on every visit?

- Smart Cards
- Unique Identifier
- Biometric Devices
- Any Other

10. Give your opinion about obtaining patient’s consent for accessing or sharing his/her health information by various legitimate users.

- Strongly Agree
- Agree
- Somewhat Agree
- Disagree
- Strongly Disagree

11. How many times have you experienced any kind of security breach to health data of the patients in your hospital/clinic?

- Quite Frequently
- Often
- Sometimes
- Less Often
- Never

12. How much will you rate the level of physical security deployed in your hospital for preventing theft and illegal entry into the premises? (Point Scale: 1-7 with 1 as low and 7 as high)

- 1
- 2
- 3
- 4
- 5
- 6
- 7

13. How frequently do the professionals need to share health records between departments of the hospital?

- Quite Frequently
- Often
- Sometimes
- Less Often
- Never

14. Do you think that chances to data breach are higher in data sharing between different hospitals as compared with sharing of data within the same hospital?

- Strongly Agree
- Agree
- Somewhat Agree
- Disagree
- Strongly Disagree

15. What is the media used to access the health data of the patient? (Multiple Selection Possible)

- CDs
- Secured E-mail
- USB Thumb Drives
- Third Party Services
- Unsecured E-mail
- Web Portals
- Any Other

16. In case of patient switching clinics/hospitals from time to time, how his/her electronic medical records should be made accessible to the doctors?
17. How much data should be transferred between hospitals/clinics for providing health care services?

- Complete Medical Records
- Only Current Records
- Relevant Records
- As Per Demand

Any Other

18. According to you, who should decide about the amount of information to be provided to other hospital or doctor in case of referral cases?

- Doctor-in-charge of taking care of the patient
- Patient himself
- Doctor-in-charge and HOD of the Department

Any Other

19. Do you think that patient is conscious about how well the hospital maintains the confidentiality and privacy of his/her health records?

- Absolutely
- Quite Often
- Sometimes
- Rarely
- Never

20. Who is authorizing access of data to paramedical staff?

- Head Nurse
- Doctor
- IT Team
- HR Dept

Any Other

21. What kind of data is accessed by paramedical staff? (Multiple Selection Possible)

- Complete Data
- Prescriptions Only
- Diagnostic Data
- Personal Details

Any Other

22. How much mature is the security environment of your hospital? Rate your opinion on a point scale of 1-7 with 1 as least mature and 7 as highly mature.

1  2  3  4  5  6  7

23. What are the security tools that are in place to prevent data loss and breach in your organization?

- Firewall
- Encryption
- Single Sign-on
- Electronic Signatures
- Biometric Technologies
- Wireless Security Protocols

Any Other

24. According to you should the privacy of data in electronic storage be monitored and controlled by IT and Hospital staff jointly?

- Strongly Agree
- Agree
- Somewhat Agree
- Disagree
- Strongly Disagree

25. Do you think that strict security policies bring down the performance of the system in terms of speed and time?

- Strongly Agree
- Agree
- Somewhat Agree
- Disagree
- Strongly Disagree

26. How often do you experience unavailability of data due to some problem in the hospital management system installed at your work place?

- Always
- Quite Often
- Sometimes
- Rarely
- Never
27. Rate the response time of the application during heavy rush of the patients specially in OPDs

| Very High | High | Moderate | Low | Very Low |

28. Does the hospital management system incorporate international standards like ISO/IEC 27001 for ensuring confidentiality and integrity of health information?

| Always | Quite Often | Sometimes | Rarely | Never |

29. Rate your satisfaction level in terms of performance of the system for displaying the required data from data-centre to the hospital/clinic over the network.

| Highly Satisfied | Moderately Satisfied | Less Satisfied | Not Satisfied | Not Applicable |

30. What is most widely used for policy compliance monitoring in your hospital?

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<tr>
<th>Audit Logs of Firewall</th>
<th>Information from servers</th>
<th>Information from Applications</th>
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<tr>
<td>Intrusion Detection Systems</td>
<td>Network Devices</td>
<td>Any Other:.........................</td>
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Thanks a Lot for your Time and Effort
Questionnaire for All under Healthcare Environment

Automation in Health sector is enabling the care providers sharing the patient’s health data electronically. This sharing of health data enables quick access and decision making by the doctors thereby providing better healthcare services to the patients. Use of Technology in healthcare has drastically reduced the time required in transferring patient’s records from one remote location to another. The hospitals and clinics have adopted customized software applications to store patient’s data and refer it while providing healthcare to the patients. Accessing electronic health records (EHRs) over the network by various stakeholders that includes, doctors, paramedical staff, patients, IT people and others, expose them to various security threats and breaches. The need for effective IT security management in healthcare is made all the more urgent by the increasing use of wireless and Internet technologies in healthcare delivery. If not implemented properly, these complex technologies will increase the risks to the confidentiality, integrity and availability of health information. A consistent approach to IT security, understandable by all involved in healthcare, will improve staff morale and increase the trust of the public in the systems that maintain personal health information.

The survey is conducted with the objective of identifying the security issues while sharing patient’s health data by doctors in integrated health environment i.e. when data is shared by various doctors in inter as well as intra hospital environment. It is required to further investigate how doctors decide on various levels of security for maintaining confidentiality and privacy of health records of their patients and accessing them from various locations.

Kindly give your opinions on various issues and scenarios existing in real-time hospital environment by filling this questionnaire.

PERSONAL DETAILS

Name: [Name] Hospital: [Hospital]
Age: [Age] Gender: [Gender]
Department: [Department]
Designation: [Designation]
Mobile: [Mobile]

1. How frequently do doctors or others change their passwords? (Don't know)
   - Always
   - Quite Often
   - Sometimes
   - Rarely
   - Never

2. How frequently do doctors or others in healthcare services share their passwords with colleagues?
   (Don’t know)
   - Always
   - Quite Often
   - Sometimes
   - Rarely
   - Never

3. Do you think that doctors and paramedical staff would gain additional access rights over the time due to frequent shift of duties from one department to another?
   - Strongly Agree
   - Agree
   - Somewhat Agree
   - Disagree
   - Strongly Disagree

4. Do you think that every doctor of the hospital should have full access rights on any patient’s data?
   - Always
   - Quite Often
   - Sometimes
   - Rarely
   - Never
5. In your opinion, how much access is provided to experts and specialists who are called per-case basis?  
- Complete Access  
- Only Required Details  
- Partial Access  
- Read-Only copy of required details

6. Do you think that doctors who visit on call should be given separate logins for ascertaining secured access to the electronic health records of the patients?  
- Strongly Agree  
- Agree  
- Somewhat Agree  
- Disagree  
- Strongly Disagree

7. The doctor on-panel of more than one hospital can treat the patient at any location resulting in redundant and inconsistent storage of patient’s health information. Give your opinion on it.  
- Strongly Agree  
- Agree  
- Somewhat Agree  
- Disagree  
- Strongly Disagree

8. Do you think that patient should be given full control over his health data?  
- Strongly Agree  
- Agree  
- Somewhat Agree  
- Disagree  
- Strongly Disagree

9. What security measures are used in your hospital to identify the patients on every visit?  
- Smart Cards  
- Unique Identifier  
- Biometric Devices  
- Any Other ......................

10. Give your opinion about obtaining patient’s consent for accessing or sharing his/her health information by various legitimate users.  
- Strongly Agree  
- Agree  
- Somewhat Agree  
- Disagree  
- Strongly Disagree

11. How many times have you experienced any kind of security breach to health data of the patients in your hospital/clinic?  
- Quite Frequently  
- Often  
- Sometimes  
- Less Often  
- Never

12. How much will you rate the level of physical security deployed in your hospital for preventing theft and illegal entry into the premises? (Point Scale: 1-7 with 1 as low and 7 as high)  
- 1  
- 2  
- 3  
- 4  
- 5  
- 6  
- 7

13. How frequently do the professionals need to share health records between departments of the hospital?  
- Quite Frequently  
- Often  
- Sometimes  
- Less Often  
- Never

14. Do you think that chances to data breach are higher in data sharing between different hospitals as compared with sharing of data within the same hospital?  
- Strongly Agree  
- Agree  
- Somewhat Agree  
- Disagree  
- Strongly Disagree

15. What is the media used to access the health data of the patient?  (Multiple Selection Possible)  
- CD/DVD  
- Secure E-mail  
- USB Thumb Drives  
- Third Party Services  
- Unencrypted E-mail  
- Web Portals  
- Any Other .............................................

16. In case of patient switching clinics/hospitals from time to time, how his/her electronic medical records should be made accessible to the doctors?
17. How much data should be transferred between hospitals/clinics for providing health care services?

- Complete Medical Records
- Only Current Records
- Relevant Records
- As Per Demand
- Any Other

18. According to you, who should decide about the amount of information to be provided to other hospital or doctor in case of referral cases?

- Doctor-in-charge of taking care of the patient
- Doctor-in-charge and HOD of the Department
- Any Other

19. Do you think that patient is conscious about how well the hospital maintains the confidentiality and privacy of his/her health records?

- Absolutely
- Quite Often
- Sometimes
- Rarely
- Never

20. Who is authorising access of data to paramedical staff?

- Head Nurse
- Doctor
- IT Team
- HR Dept
- Any Other

21. What kind of data is accessed by paramedical staff? (Multiple Selection Possible)

- Complete Data
- Prescriptions Only
- Diagnostic Data
- Personal Details
- Any Other

22. How mature is the security environment of your hospital? Rate your opinion on a point scale of 1-7 with 1 as least mature and 7 as highly mature.

1 2 3 4 5 6 7

23. What are the security tools that are in place to prevent data loss and breach in your organization?

- Firewalls
- Encryption
- Single Sign-on
- Electronic Signatures
- Biometric Technologies
- Wireless Security Protocols
- Any Other

24. According to you should the privacy of data in electronic storage be monitored and controlled by IT and Hospital staff jointly?

- Strongly Agree
- Agree
- Somewhat Agree
- Disagree
- Strongly Disagree

25. Do you think that strict security policies bring down the performance of the system in terms of speed and time?

- Strongly Agree
- Agree
- Somewhat Agree
- Disagree
- Strongly Disagree

26. How often do you experience unavailability of data due to some problem in the hospital management system installed at your workplace?

- Always
- Quite Often
- Sometimes
- Rarely
- Never
27. Rate the response time of the application during heavy rush of the patients specially in OPDs

Very High  High  Moderate  Low  Very Low

28. Does the hospital management system incorporate international standards like ISO/IEC 27001 for ensuring confidentiality and integrity of health information? (Always, Quite Often, Sometimes, Rarely, Never)

29. Rate your satisfaction level in terms of performance of the system for displaying the required data from data-centre to the hospital/clinic over the network.

Highly Satisfied  Moderately Satisfied  Less Satisfied  Not Satisfied  Not Applicable

30. What is most widely used for policy compliance monitoring in your hospital? (Audit Logs of Firewall, Information from servers, Information from Applications, Intrusion Detection Systems, Network Devices, Any Other)

Thanks a Lot for your Time and Effort
Questionnaire for All under Healthcare Environment

Automation in Health sector is enabling the care providers sharing the patient’s health data electronically. This sharing of health data enables quick access and decision making by the doctors thereby providing better healthcare services to the patients. Accessing electronic health records (EHRs) over the network by various stakeholders that includes doctors, paramedical staff, patients, IT people and others, expose them to various security threats and breaches. A consistent approach to IT security, understandable by all involved in healthcare, will improve staff morale and increase the trust of the public in the systems that maintain personal health information.

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Kindly give your opinions on various issues and scenarios existing in real-time hospital environment by filling this questionnaire.

Instructions for Filling and Sending Back the Questionnaire:

1. Select your answer and change its color from Font Color Tool on Font Tool Bar.
2. Save a copy of the file and mail back as attachment.

PERSONAL DETAILS

Name: NAVAN BALBIR SINGH
Hospital: INJP
Age: 20
Gender: Female
Department: OPHTHALMOLOGY
Designation: STUDENT
Mobile: 9810084692

1. How frequently do doctors or others change their passwords?
   - Always
   - Quite Often
   - Sometimes
   - Rarely
   - Never

2. How frequently does doctors or others in healthcare services, share their passwords with colleagues?
   - Always
   - Quite Often
   - Sometimes
   - Rarely
   - Never

3. Do you think that doctors and paramedical staff would gain additional access rights over the time due to frequent shift of duties from one department to another?
   - Strongly Agree
   - Agree
   - Somewhat Agree
   - Disagree
   - Strongly Disagree

4. Do you think that every doctor of the hospital should have full access rights on any patient’s data?
   - Always
   - Quite Often
   - Sometimes
   - Rarely
   - Never
5. In your opinion, how much access is provided to experts and specialists who are called per-case basis?  
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<th>Complete Access</th>
<th>Partial Access</th>
<th>Only Required Details</th>
<th>Partial Access</th>
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</thead>
</table>

6. Do you think that doctors who visit on call should be given separate logins for ascertaining secured access to the electronic health records of the patients?  
   | Strongly Agree | Agree | Somewhat Agree | Disagree | Strongly Disagree |

7. The doctor on-panel of more than one hospital can treat the patient at any location resulting in redundant and inconsistent storage of patient’s health information. Give your opinion on it.  
   | Strongly Agree | Agree | Somewhat Agree | Disagree | Strongly Disagree |

8. Do you think that patient should be given full control over his health data?  
   | Strongly Agree | Agree | Somewhat Agree | Disagree | Strongly Disagree |

9. What security measures are used in your hospital to identify the patients on every visit?  
   - Smart Cards  
   - Unique Identifier  
   - Biometric Devices  
   - Any Other: **NONE**

10. Give your opinion about obtaining patient’s consent for accessing or sharing his/her health information by various legitimate users.  
    | Strongly Agree | Agree | Somewhat Agree | Disagree | Strongly Disagree |

11. How many times have you experienced any kind of security breach to health data of the patients in your hospital/clinic?  
    | Quite Frequently | Often | Sometimes | Less Often | Never |

12. How much will you rate the level of physical security deployed in your hospital for preventing theft and illegal entry into the premises? (Point Scale: 1 - 7 with 1 as low and 7 as high)  
    | 2 | 3 | 4 | 5 | 6 | 7 |

13. How frequently do the professionals need to share health records between departments of the hospital?  
    | Quite Frequently | Often | Sometimes | Less Often | Never |

14. Do you think that chances to data breach are higher in data sharing between different hospitals as compared with sharing of data within the same hospital?  
    | Strongly Agree | Agree | Somewhat Agree | Disagree | Strongly Disagree |

15. What is the media used to access the health data of the patient? (Multiple Selection Possible)  
    - CDs  
    - Secured E-mail  
    - USB Thumb Drives  
    - Third Party Services  
    - Encrypted E-mail  
    - Web Portals  
    - Any Other: **NONE**
16. In case of patient switching clinics/hospitals from time to time, how his/her electronic medical records should be made accessible to the doctors?

Direct Access to the Data-store
Partial Access to Data-store
Required Data send as Message from the data-store
Any Other: _______________________

17. How much data should be transferred between hospitals/clinics for providing health care services?

Complete Medical Records
Only Current Records
Relevant Records
As Per Demand
Any Other: _______________________

18. According to you, who should decide about the amount of information to be provided to other hospital or doctor in case of referral cases?

Doctor-in-charge of taking care of the patient
Doctor-in-charge and HOD of the Department
Patient himself
Any Other: _______________________

19. Do you think that patient is conscious about how well the hospital maintains the confidentiality and privacy of his/her health records?

Absolutely
Quite Often
Sometimes
Rarely
Never

20. Who is authorizing access of data to paramedical staff?

Head Nurse
Doctor
IT Team
HR Dept
Any Other: _______________________

21. What kind of data is accessed by paramedical staff? (Multiple Selection Possible)

Complete Data
Prescriptions Only
Diagnostic Data
Personal Details
Any Other: _______________________

22. How mature is the security environment of your hospital? Rate your opinion on a point scale of 1-7 with 1 as least mature and 7 as highly mature.

1 2 3 4 5 6 7

23. What are the security tools that are in place to prevent data loss and breach in your organization?

Firewall
Encryption
Single Sign-on
Electronic Signatures
Biometric Technologies
Wireless Security Protocols
Any Other: NONE

24. According to you should the privacy of data in electronic storage be monitored and controlled by IT and Hospital staff jointly?

Strongly Agree
Agree
Somewhat Agree
Disagree
Strongly Disagree

25. Do you think that strict security policies bring down the performance of the system in terms of speed and time?

Strongly Agree
Agree
Somewhat Agree
Disagree
Strongly Disagree
26. How often do you experience unavailability of data due to some problem in the hospital management system installed at your workplace?

Always  Quite Often  Sometimes  Rarely  Never

27. Rate the response time of the application during heavy rush of the patients specially in OPD.

Very High  High  Moderate  Low  Very Low

28. Does the hospital management system incorporate international standards like ISO/IEC 27001 for ensuring confidentiality and integrity of health information?

Always  Quite Often  Sometimes  Rarely  Never

29. Rate your satisfaction level in terms of performance of the system for displaying the required data from data-centre to the hospital/clinic over the network.

Highly Satisfied  Moderately Satisfied  Less Satisfied  Not Satisfied  Not Applicable

30. What is most widely used for policy compliance monitoring in your hospital?

Audit Logs of Firewall  Information from servers  Information from Applications

Intrusion Detection Systems  Network Devices  Any Other: None

Thanks a lot for your time and effort.