



Hopewell Hospital

Colombo, Sri Lanka

Risk assessment Report

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Executive summary

The annual Information Security Risk Assessment report was carried out regarding critical IT assets of Hopewell hospital. This risk assessment was specially recommended with the implementation of new Pacemaker system, automated oxygen supply system and the patient smart card system which operates with cutting edge technologies that gives the organization a competing advantage in the industry.

The risk assessment was done by the risk assessment team of Hopewell hospital considering how violation of three key principles (Confidentiality, Integrity, Availability) of cyber security could affect these systems and as well as existing critical IT assets of the system. This report contains recommendations to be implemented in order to overcome the threats generated by these assets.

Key issues and recommendations

- **For databases that use older server versions, update and install the latest versions.**

Patient information management system, Patient smart card system, HR information management system, Inventory management and drug distribution system and pacemaker system needs upgrade of server versions.

- **Implement a firewall to detect unauthorized access to the internal network.**
- **Implement a password policy, privilege policy and a software upgrade policy.**
- **Implement a CCTV monitoring system for the assets, Inventory management system and automated oxygen supply system locations.**
- **Implement a DRP (Disaster recovery plan) and BCP (Business continuity plan) to overcome unexpected incidents.**

Detailed analysis

Introduction

Hopewell hospital is a well reputed private hospital located in Colombo, Sri Lanka. It has provided a quality service for the patients including clinical services, short-term hospitalization services, emergency room services, X-ray and laboratory services and surgery related services for the past 10 years. Hopewell has transformed their manual operational procedures to automated procedures within the past few years which owned them the assets such as a patient information system, HR management system, inventory and drug distribution management system. And, with the evolution of technology, hospital management added new automated systems containing cutting edge technology such a pacemaker system, patient information smart card system and an automated oxygen supply system.

Details and functionalities of these assets are listed below.

<u>Patient information management system</u> A database containing patient details, medical history, and payment history. Was designed initially using Microsoft SQL server 2017 which is currently outdated. Uses a frontend software which is also outdated.	<u>HR information management system</u> A database includes all employee details, payroll details, attendance tracking and performance details. Was designed initially using Microsoft SQL server 2017 which is currently outdated. Uses a frontend software which is also outdated.
<u>Inventory management and Drugs distribution system</u> All the logs of distributing drugs, details of inventory and inventory bills for purchased drugs are stored in this database. Was designed initially using Microsoft SQL server 2017 which is currently outdated. Uses a frontend software which is also outdated.	<u>Patient Information smart card system</u> This is a system that manages patient information using a Smart card system which allows patients easy access to the services provided by the hospital. Uses a thin card with an embedded chip inside. The database was initially designed using MySQL server 8.0.14 (2019)
<u>Pacemaker system</u> This is a mobile heart monitoring system which monitors critical patients with heart relate issues and includes a device which can send alerts to an emergency ambulance service and which can also give an electric shock for the patient in an emergency.	<u>Automated oxygen supply system</u> This is an automated oxygen supply system, managed using a software program, which is used to manage the oxygen generators and distribution of oxygen through the hospital rooms.

Risk assessment methodology and framework

For conducting this risk assessment report, Octave allegro risk assessment framework was used by the risk assessment team. This was selected because Hopewell hospital needed immediate results delivery from the risk assessment which is easier to provide the top to bottom approach that Octave allegro risk framework provides.

Risk assessment team

Department	Position	Name
Human resources	HR manager	Ms. H.R Dharmasena
Drug stores	Pharmacist	Mr. Asela Gunasinghe
IT department	Database administrator	Mr. G. Rajapakshe
IT department	Network administrator	Mr. K. M. Bandara
Emergency room services	Medical officer	Dr. Nimali de Silva

To address the risks with most severity a risk tolerance level was decided. And threats below that level was counted as acceptable risks.

Risk tolerance level = 10.0

Critical assets and threat profiles and their risk scores (Refer appendix A/ B) (red – acceptable risks)

Patient Information management system (A1) A1.T1 (17.5), A1.T2(19.5), A1.T3(19.5), A1.T4(14.5), A1.T5(18), A1.T6(6.5)	Patient Information smart card system (A2) A2.T1(6.5) , A2.T2(5) , A2.T3 (17.5), A2.T4(14.5)	HR information management system A3.T1 (16), A3.T2(17.5), A3.T3(17.5), A3.T4(11.5), A3.T5(15.5), A3.T6(6.5) , A3.T7(6.75)
Inventory management and Drugs distribution system A4.T1 (17.5), A4.T2(17.5), A4.T3(15.5), A4.T4(6.25) , A4.T5(6.5)	Pacemaker system A5.T1 (20), A5.T2(21), A5.T3(13)	Automated oxygen supply system A5.T1 (10.25), A6.T2(10), A6.T3(10)

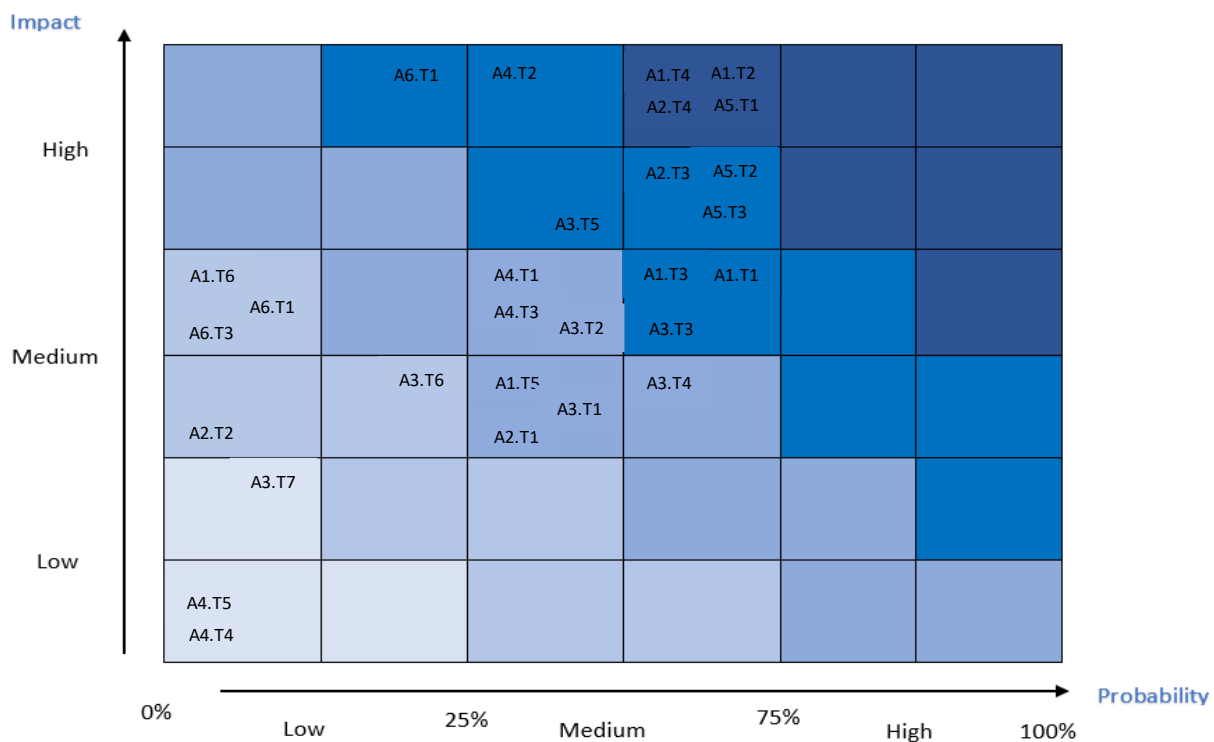
Asset	Threats and vulnerabilities	Impact	Mitigation techniques
Patient information management system	An accidental modification of patient information can be happened. (probability – 50%)	Since this database stores all the patient details including medical details of the patient, these threats could result in Potential data loss, possible financial loss, affect in organization's productivity and safety and health of patient lives also could be affected.	<p>Install latest version of the MySQL server (8.0.23) 2021 and vulnerabilities in the server can be eliminated.</p> <p>Implement a firewall to detect unauthorized access to the internal network</p> <p>Implement a password policy, privilege policy and a software upgrade policy</p> <p>Maintain a database backup and recovery system in a separate location</p>
	A modification of patient information can be happened (probability – 50%)		
	Someone could use patient details in the system for personal gain (probability – 50%)		
	Internal employee could use patient information for personal gain (probability – 50%)		
	Availability could be lost due to a DDOS attack (probability – 50%)		
	A natural disaster can lead to loss of availability (probability – 25%)		
Patient Information smart card system	Smart card can be stolen (probability – 50%)	Since this database stores all the patient details including medical details of the patient, these threats could result in Potential data loss, possible financial loss, affect in organization's productivity and safety and health of patient lives also could be affected.	<p>Increase the awareness about the smart card's safety among card owners.</p> <p>Install latest version of the MySQL server (8.0.23) 2021 and vulnerabilities in the server can be eliminated.</p> <p>Implement a password policy and a software upgrade policy</p>
	A malicious actor could clone the smart card (probability – 25%)		
	Smart card details in the database could be disclosed. (probability – 50%)		
	Internal employee could use patient		

	information for personal gain (probability – 50%)		
HR information management system	Cause an accidental modification of employee personal information (probability – 50%)	Since this database includes all the critical employee details if any disclosure or a modification of the data could result in disclosure to unauthorized parties or can be traded to third parties. This will affect hospital's productivity and a financial loss.	<p>Install latest version of the MySQL server (8.0.23) 2021 and vulnerabilities in the server can be eliminated.</p> <p>Implement a password policy, privilege policy and a software upgrade policy</p> <p>Maintain a database backup and recovery system in a separate location</p> <p>Implement a firewall to detect unauthorized access to the internal network</p>
	Cause purposely modification of employee personal information (probability – 50%)		
	External person could use employee confidential details in the system for personal gain (probability – 50%)		
	Internal employee could use employee confidential information for personal gain (probability – 50%)		
	Availability of system can be lost because of a DDOS attack (probability – 50%)		
	A natural disaster can lead to loss of availability (probability – 25%)		
	External actor could harm the server hardware (Physical threat) (probability – 25%)		

Inventory management and Drugs distribution system	Inventory logs can be changed by an internal employee (probability – 50%)	Since all the inventory and drugs distribution details are handled by this system, a disclosure or a modification can risk patients' lives due to lack of medical supplies. And it can affect the reputation and the financial status of the hospital. Fines and legal penalties could be applied if a patient's life is threatened due to a modification of medical supplies.	<p>Install latest version of the MySQL server (8.0.23) 2021 and vulnerabilities in the server can be eliminated.</p> <p>Implement a password policy, privilege policy and a software upgrade policy</p> <p>Maintain a database backup and recovery system in a separate location</p> <p>Implement a firewall to detect unauthorized access to the internal network</p> <p>Implement a CCTV monitoring system</p>
	Inventory logs can be changed by an external malicious actor (probability – 50%)		
	Availability of system can be lost because of a DDOS attack (probability – 50%)		
	External actor could harm the server hardware (Physical threat) (probability – 25%)		
	A natural disaster can lead to loss of availability (probability – 25%)		
Pacemaker system	Deliberately reprogram the system that can disrupt the patient's heart rhythm (probability – 50%)	Since this is a system that contains a device connected directly with a patient's heart, a modification or a disclosure could be life threatening for the patient. This could affect the hospital's reputation and in a financial loss as well.	<p>Install latest version of the MySQL server (8.0.23) 2021 and vulnerabilities in the server can be eliminated.</p> <p>Implement a password policy, privilege policy and a software upgrade policy for the database use.</p> <p>Maintain a database backup and recovery system in a separate location</p> <p>Implement a firewall to detect unauthorized access to the internal network</p>
	Disclosure of patient's sensitive information (probability – 75%)		
	Modification of patient information in database tables (probability – 50%)	Since patient's lives are affected fines and legal penalties could be applied.	

Automated oxygen supply system	Modification of oxygen supply level (Probability – 25%)	<p>Since this system manages the oxygen supply for the patients, a modification could be life threatening for the patient. This could affect the hospital's reputation and in a financial loss as well.</p> <p>Since patient's lives are affected fines and legal penalties could be applied.</p>	<p>Implement a password policy, privilege policy and a software upgrade policy for the database use.</p> <p>Maintain a recovery system in a separate location</p> <p>Implement a firewall to detect unauthorized access to the internal network</p> <p>Implement a CCTV monitoring system</p>
	A natural disaster can lead to loss of availability (probability – 25%)		
	External actor could harm the oxygen generators (Physical threat) (probability – 25%)		

Heat Map (6 x 6)



Overall recommended mitigations

- **For databases that uses MySQL older versions, update and install the latest MySQL server 8.0.23 2021 version.**

In older MySQL 2017 version this has several critical vulnerabilities,
CVE-2019-1068 (remote execution code vulnerability)
CVE-2019-0819 (information disclosure vulnerability)
CVE-2019-1332 (XSS vulnerability)
CVE-2018-8273 (buffer overflow vulnerability)

- **Implement a firewall to detect unauthorized access to the internal network.**

Since 5 out of 6 critical assets selected suggests implementing a firewall, an overall firewall covering inbound and outgoing network traffic in the internal network should be implemented.

- **Implement a password policy, privilege policy and a software upgrade policy.**

A strong password policy for employees is needed.

Suggestions are: A password contains more than 8 characters including both lowercase uppercase letters, special characters and numbers.

A privilege policy should be implemented defining which employees can access which critical data stored in the databases.

A policy on software upgrades should be implemented suggesting how frequently that database server software and frontend software should be updated.

- **Maintain database backup and recovery system in a separate location**

To countermeasure the consequences of natural disasters, maintaining database and recovery system in a separate location is recommended.

- **Implement a CCTV monitoring system for the assets, Inventory management system and automated oxygen supply system locations.**

- **Implement a DRP (Disaster recovery plan) and BCP (Business continuity plan) to overcome unexpected incidents.**

Appendix A (Asset profiles)

Allegro Worksheet 8		ASSET PROFILE A.1	
(1) Critical Asset <i>What is the critical information asset?</i>	(2) Rationale for Selection <i>Why is this information asset important to the organization?</i>	(3) Description <i>What is the agreed-upon description of this information asset?</i>	
Patient Information management system (Database)	Includes patient details therefore a disclosure or modification can be critical for both patient	Includes a database contains patient details, medical history, and payment history.	
(4) Owner(s) <i>Who owns this information asset?</i>			
Director – Hopewell hospital			
(5) Security Requirements <i>What are the security requirements for this information asset?</i>			
<input type="checkbox"/> Confidentiality	Only authorized personnel can view this information asset, as follows:	Information cannot be disclosed to unauthorized parties since critical details on patients are stored including prescriptions and medical history	
<input type="checkbox"/> Integrity	Only authorized personnel can modify this information asset, as follows:	A modification of patient details can even be life threatening.	
<input type="checkbox"/> Availability	This asset must be available for these personnel to do their jobs, as follows:	Information should be available to treat patients in an effective manner	
<input type="checkbox"/> Other	This asset must be available for 24 hours, 7 days/week, 52 weeks/year.	99.99%	
(6) Most Important Security Requirement <i>What is the most important security requirement for this information asset?</i>			
<input type="checkbox"/> Confidentiality	<input checked="" type="checkbox"/> Integrity	<input type="checkbox"/> Availability	<input type="checkbox"/> Other

Allegro Worksheet 8		ASSET PROFILE A.2	
(1) Critical Asset <i>What is the critical information asset?</i>	(2) Rationale for Selection <i>Why is this information asset important to the organization?</i>	(3) Description <i>What is the agreed-upon description of this information asset?</i>	
Patient Information smart card system	This manages patient information in a smart card, a disclosure can affect confidentiality of patient details.	This is a system that manages patient information using a Smart card system which allows patients easy access to the services provided by the hospital	
(4) Owner(s) <i>Who owns this information asset?</i>			
Director – Hopewell hospital			
(5) Security Requirements <i>What are the security requirements for this information asset?</i>			
<input type="checkbox"/> Confidentiality	Only authorized personnel can view this information asset, as follows:	A disclosure of patient information can affect patient's privacy	
<input type="checkbox"/> Integrity	Only authorized personnel can modify this information asset, as follows:	A modification of patient medical details can cause in improper treatment which can be life threatening for the patient.	
<input type="checkbox"/> Availability	This asset must be available for these personnel to do their jobs, as follows:	System must be available for authorized hospital staff to get information regarding the patient.	
	This asset must be available for 24 hours, 7 days/week, 51 weeks/year.	95%	
<input type="checkbox"/> Other	This asset has special regulatory compliance protection requirements, as follows:		
(6) Most Important Security Requirement <i>What is the most important security requirement for this information asset?</i>			
<input type="checkbox"/> Confidentiality	<input type="checkbox"/> Integrity	<input type="checkbox"/> Availability	<input type="checkbox"/> Other

Allegro Worksheet 8		ASSET PROFILE A.3	
(1) Critical Asset <i>What is the critical information asset?</i>	(2) Rationale for Selection <i>Why is this information asset important to the organization?</i>	(3) Description <i>What is the agreed-upon description of this information asset?</i>	
HR information management system	Include employee details therefore a disclosure or modification can be critical for the organisation.	This is the database includes all employee details, payroll details, attendance tracking and performance details	
(4) Owner(s) <i>Who owns this information asset?</i>			
HR manager			
(5) Security Requirements <i>What are the security requirements for this information asset?</i>			
<input type="checkbox"/> Confidentiality	Only authorized personnel can view this information asset, as follows:	Information cannot be disclosed to unauthorized parties since critical employee details are stored including payroll details	
<input type="checkbox"/> Integrity	Only authorized personnel can modify this information asset, as follows:	A modification of employee details can result in operational malfunction Ex: changes of employee bank details can result in financial loss	
<input type="checkbox"/> Availability	This asset must be available for these personnel to do their jobs, as follows:	HR team need the system running to run their operations.	
	This asset must be available for 24 hours, 7 days/week, 51 weeks/year.	Should be available 95.3% of time	
<input type="checkbox"/> Other	This asset has special regulatory compliance protection requirements, as follows:		
(6) Most Important Security Requirement <i>What is the most important security requirement for this information asset?</i>			
<input type="checkbox"/> Confidentiality	<input type="checkbox"/> Integrity	<input type="checkbox"/> Availability	<input type="checkbox"/> Other

Allegro Worksheet 8		ASSET PROFILE A.4	
(1) Critical Asset <i>What is the critical information asset?</i>	(2) Rationale for Selection <i>Why is this information asset important to the organization?</i>	(3) Description <i>What is the agreed-upon description of this information asset?</i>	
Inventory management and Drugs distribution system	Flaw of operations can be affected by a modification of the asset, which will lead to a financial loss or can	All the logs of distributing drugs, details of inventory and inventory bills for purchased drugs are stored in this database.	
(4) Owner(s) <i>Who owns this information asset?</i>			
Manager - supplies			
(5) Security Requirements <i>What are the security requirements for this information asset?</i>			
<input type="checkbox"/> Confidentiality	Only authorized personnel can view this information asset, as		
<input type="checkbox"/> Integrity	Only authorized personnel can modify this information asset, as follows:	A modification can be affecting the hospital to run the drug stock that they possess which can eventually fail the operations of the hospital. Reputation also can be affected.	
<input type="checkbox"/> Availability	This asset must be available for these personnel to do their jobs, as follows:	Should be available to check the current stocks when needed.	
	This asset must be available for 20 hours, 7 days/week, 50 weeks/year.	83%	
<input type="checkbox"/> Other	This asset has special regulatory compliance protection requirements, as follows:		
(6) Most Important Security Requirement <i>What is the most important security requirement for this information asset?</i>			
<input type="checkbox"/> Confidentiality	<input type="checkbox"/> Integrity	<input type="checkbox"/> Availability	<input type="checkbox"/> Other

Allegro Worksheet 8		ASSET PROFILE A.5	
(1) Critical Asset <i>What is the critical information asset?</i>	(2) Rationale for Selection <i>Why is this information asset important to the organization?</i>	(3) Description <i>What is the agreed-upon description of this information asset?</i>	
Pacemaker system	Since this a mobile heart monitoring system for patients, a malfunction can be life threatening for a patient and can cause reputation loss for the	This is a mobile heart monitoring system which monitors critical patients with heart relate issues and includes a device which can send alerts to an emergency ambulance service and which can also give an electric shock for the patient in an emergency.	
(4) Owner(s) <i>Who owns this information asset?</i>			
Manager – pacemaker system			
(5) Security Requirements <i>What are the security requirements for this information asset?</i>			
<input type="checkbox"/> Confidentiality	Only authorized personnel can view this information asset, as follows:	A disclosure can be life threatening because it contains a device that can cause an electric shock in an emergency. This can lead the hospital to a severe reputational loss.	
<input type="checkbox"/> Integrity	Only authorized personnel can modify this information asset, as follows:	A modification can led to supply false information regarding patients for the system, which can eventually be life threatening for the patient. This can lead the hospital to a severe reputational loss.	
<input type="checkbox"/> Availability	This asset must be available for these personnel to do their jobs, as follows:	Should be available 24/7 for patients in an emergency.	
	This asset must be available for 24 hours, 7 days/week, 52 weeks/year.	99.99%	
<input type="checkbox"/> Other	This asset has special regulatory compliance protection requirements,		
(6) Most Important Security Requirement <i>What is the most important security requirement for this information asset?</i>			
<input type="checkbox"/> Confidentiality	<input type="checkbox"/> Integrity	<input type="checkbox"/> Availability	<input type="checkbox"/> Other

Allegro Worksheet 8		ASSET PROFILE A.6	
(1) Critical Asset <i>What is the critical information asset?</i>	(2) Rationale for Selection <i>Why is this information asset important to the organization?</i>	(3) Description <i>What is the agreed-upon description of this information asset?</i>	
Automated oxygen supply system	Oxygen supply should be continuous for the treatment of patients. And any modification or loss of availability can be life threatening for patients,	This is an automated oxygen supply system, managed using a software programme, which is used to manage the oxygen generators and distribution of oxygen through the hospital rooms.	
(4) Owner(s) <i>Who owns this information asset?</i>			
Manager - supplies			
(5) Security Requirements <i>What are the security requirements for this information asset?</i>			
<input type="checkbox"/> Confidentiality	Only authorized personnel can view this information asset, as follows:		
<input type="checkbox"/> Integrity	Only authorized personnel can modify this information asset, as follows:	A modification can be life threatening for patients. This can cause a reputational loss and eventually a financial loss for the hospital.	
<input type="checkbox"/> Availability	This asset must be available for these personnel to do their jobs, as follows:	System should be available because loss of oxygen supply can be life threatening for patients. This can cause a reputational loss and eventually a financial loss for the hospital.	
	This asset must be available for 24 hours, 7 days/week, 52 weeks/year.	99.99%	
<input type="checkbox"/> Other	This asset has special regulatory compliance protection requirements,		
(6) Most Important Security Requirement <i>What is the most important security requirement for this information asset?</i>			
<input type="checkbox"/> Confidentiality	<input type="checkbox"/> Integrity	<input checked="" type="checkbox"/> Availability	<input type="checkbox"/> Other

Appendix B (Threat profiles)

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A1.T1)				
Information Asset Risk	Threat	Information Asset	Patient information management			
		Area of Concern	An accidental modification of patient information can be happened.			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Internal employee			
		(2) Means <i>How would the actor do it? What would they do?</i>	Change patient information in the database tables			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Accidental			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity can be violated since patient details are modified.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Reputation of the hospital can be affected severely because of a change of a patient data which can even be life threatening. This can be affective in a financial manner as well.		Reputation & Customer Confidence	9	4.5	
			Financial	7	3.5	
	A change in database can moderately affect operational procedures in hospital therefore a value 6 was given. It can affect safety and health of patients because the medical details have been changed.		Productivity	6	3	
			Safety & Health	8	4	
If a life threatening situation occurred because of a modification in tables, fines and legal penalties can be occurred.		Fines & Legal Penalties	5	2.5		
		User Defined Impact Area				
Relative Risk Score				17.5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A1.T2)				
Information Asset Risk	Threat	Information Asset	Patient information management system			
		Area of Concern	A modification of patient information can be happened			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	External			
		(2) Means <i>How would the actor do it? What would they do?</i>	Change patient information in the database tables			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input checked="" type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity can be violated since patient details are modified.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input checked="" type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Reputation of the hospital can be affected severely because of a change of a patient data which can even be life threatening. This can be affective in a financial manner as well.		Reputation & Customer Confidence	9	4.5	
			Financial	9	4.5	
	A change in database can moderately affect operational procedures in hospital therefore a value 8 was given. It can affect safety and health of patients because the medical details have been changed.		Productivity	8	4	
			Safety & Health	8	4	
	If a life threatening situation occurred because of a modification in tables, fines and legal penalties can be occurred.		Fines & Legal Penalties	5	2.5	
User Defined Impact Area						
				Relative Risk Score	19.5	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A1.T3)				
Information Asset Risk	Threat	Information Asset	Patient information management system			
		Area of Concern	Someone could use patient details in the system for personal gain			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	External malicious actor			
		(2) Means <i>How would the actor do it? What would they do?</i>	Gaining access to the database tables through a vulnerability in the server or network			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input checked="" type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Confidentiality could be violated because of disclosure of confidential patient data.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
		(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>		
				Impact Area	Value	Score
		Reputation can be affected if confidential patient data was disclosed. Could lead for a financial loss. But not relatively a critical financial loss.		Reputation & Customer Confidence	9	4.5
				Financial	8	4
		Safety and health could be affected if the malicious actor uses the obtained data to harm the patient.		Productivity	6	3
Safety & Health				8	4	
Legal penalties can be occurred if the owner of disclosed data decides to take legal actions against the hospital.		Fines & Legal Penalties	8	4		
		User Defined Impact Area				
Relative Risk Score					19.5	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A1.T4)				
Information Asset Risk	Threat	Information Asset	Patient information management system			
		Area of Concern	Internal employee could use patient information for personal gain			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Internal employee			
		(2) Means <i>How would the actor do it? What would they do?</i>	An internal employee could view data that they are not allowed to view.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Accidental/ Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input checked="" type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Confidentiality could be violated because of disclosure of confidential patient data.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Reputation can be affected if confidential patient data was disclosed. Could lead for a financial loss. But not relatively a critical financial loss.		Reputation & Customer Confidence	9	4.5	
			Financial	8	4	
	Safety and health could be affected if the actor uses the obtained data to harm the patient.		Productivity	2	1	
			Safety & Health	6	3	
	Legal penalties can be occurred if the owner of disclosed data decides to take legal actions against the hospital.		Fines & Legal Penalties	4	2	
User Defined Impact Area						
Relative Risk Score				14.5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A1.T5)				
Information Asset Risk	Threat	Information Asset	Patient information management system			
		Area of Concern	Availability could be lost due to a DDOS attack			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Hacker			
		(2) Means <i>How would the actor do it? What would they do?</i>	Launch a DDOS attack against the server			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Availability is affected because authorised parties could not access the system.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Customer confidence could be lost because required services will not be available. It could lead to a financial loss as well.		Reputation & Customer Confidence	8	4	
			Financial	9	4.5	
	Productivity can be loss because hospital staff does not have access to the medical data of patients. Safety and health of patients could be affected as well.		Productivity	8	4	
			Safety & Health	7	3.5	
			Fines & Legal Penalties	4	2	
User Defined Impact Area						
Relative Risk Score				18		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A1.T6)				
Information Asset Risk	Threat	Information Asset	Patient information management system			
		Area of Concern	A natural disaster can lead to loss of availability			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Natural			
		(2) Means <i>How would the actor do it? What would they do?</i>	An earthquake, a fire or a similar natural disaster can destroy the server room which hosts the database.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	accidental			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input checked="" type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Availability is affected because authorised parties could not access the system.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Hospital could be financially affected since the operations could be failed due to unavailability of the asset.		Reputation & Customer Confidence	2	0.5	
			Financial	8	2	
	Productivity could be affected since the required data is unavailable for employees to carry out the treatment procedures of patients.		Productivity	9	2.25	
			Safety & Health	7	1.75	
			Fines & Legal Penalties	0	0	
User Defined Impact Area						
Relative Risk Score				6.5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A2.T1)				
Information Asset Risk	Threat	Information Asset	Patient information smart card system			
		Area of Concern	Smart card can be stolen			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Thief / Hacker			
		(2) Means <i>How would the actor do it? What would they do?</i>	An actor can steal the card from the owner for personal gain			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input checked="" type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Availability could be lost due to the actual owner of the card could not benefit from the system properly.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
		(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>		
				Impact Area	Value	Score
		Since the responsibility of the smart card belongs to the card owner, this threat doesn't affect severely to the hospital's reputation.		Reputation & Customer Confidence	2	1
				Financial	2	1
		Productivity could be affected because the hospital staff could be unable to access patient data effectively.		Productivity	5	2.5
				Safety & Health	4	2
				Fines & Legal Penalties	0	0
User Defined Impact Area						
Relative Risk Score					6.5	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A2.T2)				
Information Asset Risk	Threat	Information Asset	Patient information smart card system			
		Area of Concern	A malicious actor could clone the smart card			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Hacker			
		(2) Means <i>How would the actor do it? What would they do?</i>	A malicious actor could clone the smart card and could change the medical details of a particular patient			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity could be affected because a modification of patient medical details can cause in improper treatment which can be life threatening for the patient.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
	Reputation can be affected if the sensitive patient data was modified. Could lead for a financial loss. But not relatively a critical financial loss.		Impact Area	Value	Score	
			Reputation & Customer Confidence	2	0.5	
	A modification of patient medical details can cause in improper treatment which can be life threatening for the patient. Therefore, productivity of hospital and safety of patients could be affected.		Financial	2	0.5	
			Productivity	8	2	
			Safety & Health	8	2	
			Fines & Legal Penalties	0		
User Defined Impact Area						
Relative Risk Score				5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A2.T3)				
Information Asset Risk	Threat	Information Asset	Patient information smart card system			
		Area of Concern	Smart card details in the database could be disclosed.			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Hacker			
		(2) Means <i>How would the actor do it? What would they do?</i>	Gaining access to the database tables through a vulnerability in the server or network.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input checked="" type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Confidentiality could be violated because of disclosure of confidential patient data.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
	Reputation can be affected if confidential patient data was disclosed. Could lead for a financial loss. But not relatively a critical financial loss.		Impact Area	Value	Score	
			Reputation & Customer Confidence	9	4.5	
	Safety and health could be affected if the malicious actor uses the obtained data to harm the patient.		Financial	6	3	
			Productivity	4	2	
	Legal penalties can be occurred if the owner of disclosed data decides to take legal actions against the hospital.		Safety & Health	8	4	
			Fines & Legal Penalties	8	4	
		User Defined Impact Area				
Relative Risk Score				17.5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A2.T4)				
Information Asset Risk	Threat	Information Asset	Patient information smart card system			
		Area of Concern	Internal employee could use patient information for personal gain			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Internal employee			
		(2) Means <i>How would the actor do it? What would they do?</i>	An internal employee could view data that they are not allowed to view.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Accidental/ Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input checked="" type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Confidentiality could be violated because of disclosure of confidential patient data.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input checked="" type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
	Reputation can be affected if confidential patient data was disclosed. Could lead for a financial loss. But not relatively a critical financial loss.		Impact Area	Value	Score	
			Reputation & Customer Confidence	8	4	
	Safety and health could be affected if the actor uses the obtained data to harm the patient.		Financial	5	2.5	
			Productivity	4	2	
Legal penalties can be occurred if the owner of disclosed data decides to take legal actions against the hospital.		Safety & Health	4	2		
		Fines & Legal Penalties	8	4		
		User Defined Impact Area				
Relative Risk Score					14.5	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A3.T1)				
Information Asset Risk	Threat	Information Asset	HR information management system			
		Area of Concern	Cause an accidental modification of employee personal information			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Internal employee			
		(2) Means <i>How would the actor do it? What would they do?</i>	Internal employee can accidentally change employee personal data in the database table.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Accidental			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input checked="" type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity is violated due to the modification of employee information can result in operational malfunction.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input checked="" type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	If changes happen in employee bank details can cause severe financial damage and they could misuse accounts.		Reputation & Customer Confidence	7	3.5	
			Financial	9	4.5	
	Productivity could be affected since the required data is unavailable and changes in database can affect operational procedures.		Productivity	8	4	
Safety & Health			5	2.5		
Fines and legal penalties could be applied because of incorrect details due to modification of employee information.		Fines & Legal Penalties	3	1.5		
		User Defined Impact Area				
Relative Risk Score				16.0		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A3.T2)																								
Information Asset Risk	Threat	Information Asset	HR information management system																							
		Area of Concern	Cause purposely modification of employee personal information																							
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	External employee																							
		(2) Means <i>How would the actor do it? What would they do?</i>	External employee can purposely change employee personal data in the database table																							
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate																							
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption																							
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity is violated due to the modification of employee information can result in operational malfunction.																							
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%																					
		(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>																						
		Reputation of the hospital can be affected severely due to bad impression regarding employee privacy. If changes happen in employee bank details can cause severe financial damage and they could misuse accounts. A change in database can moderately affect operational procedures in hospital. It can affect safety and health of patients because the medical details have been changed. Fines and legal penalties could be applied because of incorrect details due to modification of employee information.		<table border="1"> <thead> <tr> <th>Impact Area</th> <th>Value</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>Reputation & Customer Confidence</td> <td>9</td> <td>4.5</td> </tr> <tr> <td>Financial</td> <td>9</td> <td>4.5</td> </tr> <tr> <td>Productivity</td> <td>8</td> <td>4</td> </tr> <tr> <td>Safety & Health</td> <td>5</td> <td>2.5</td> </tr> <tr> <td>Fines & Legal Penalties</td> <td>4</td> <td>2</td> </tr> <tr> <td>User Defined Impact Area</td> <td></td> <td></td> </tr> </tbody> </table>			Impact Area	Value	Score	Reputation & Customer Confidence	9	4.5	Financial	9	4.5	Productivity	8	4	Safety & Health	5	2.5	Fines & Legal Penalties	4	2	User Defined Impact Area	
	Impact Area			Value	Score																					
	Reputation & Customer Confidence			9	4.5																					
	Financial			9	4.5																					
	Productivity			8	4																					
	Safety & Health			5	2.5																					
Fines & Legal Penalties	4	2																								
User Defined Impact Area																										
Relative Risk Score			17.5																							

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A3.T3)				
Information Asset Risk	Threat	Information Asset	HR information management system			
		Area of Concern	External person could use employee confidential details in the system for personal gain			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	External malicious actor			
		(2) Means <i>How would the actor do it? What would they do?</i>	Gaining access to the database tables through a vulnerability in the server or network.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input checked="" type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Confidentiality could be violated because of disclosure of employee confidential information.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Reputation can be affected if employee confidential information was disclosed and bad impression regarding employee privacy.		Reputation & Customer Confidence	9	4.5	
	If disclosure happen in employee bank details can lead for a financial loss. But not relatively a critical financial loss. They could misuse accounts. Employee privacy violated.		Financial	5	2.5	
	Safety and health could be affected if the malicious actor uses the obtained data to cause damage to the employee confidentiality.		Productivity	4	2	
			Safety & Health	9	4.5	
	Legal penalties can be occurred if the owner of disclosed data decides to take legal actions against the hospital.		Fines & Legal Penalties	8	4	
		User Defined Impact Area				
Relative Risk Score				17.5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A3.T4)				
Information Asset Risk	Threat	Information Asset	HR information management system			
		Area of Concern	Internal employee could use employee confidential information for personal gain			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Internal employee			
		(2) Means <i>How would the actor do it? What would they do?</i>	An internal employee could view data that they are not allowed to view.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Accidental/ Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input checked="" type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Confidentiality could be violated because of disclosure of confidential employee data.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input checked="" type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Reputation can be affected if employee confidential information was disclosed and bad impression regarding employee privacy.		Reputation & Customer Confidence	6	3	
	If disclosure happen in employee bank details can lead for a financial loss. But not relatively a critical financial loss. They could misuse accounts. Employee privacy violated.		Financial	3	1.5	
	Safety and health could be affected if the malicious actor uses the obtained data to cause damage to the employee confidentiality.		Productivity	4	2	
			Safety & Health	6	3	
	Legal penalties can be occurred if the owner of disclosed data decides to take legal actions against the hospital.		Fines & Legal Penalties	4	2	
		User Defined Impact Area				
Relative Risk Score				11.5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A3.T5)				
Information Asset Risk	Threat	Information Asset	HR information management system			
		Area of Concern	Availability of system can be lost because of a DDOS attack			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Hacker			
		(2) Means <i>How would the actor do it? What would they do?</i>	A DDOS attack can be carried out to crash the server containing the database.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Availability is affected to authorised parties could not access the system due to unstoppable interruptions.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
		(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>		
				Impact Area	Value	Score
	A financial loss can be occurred since the employee data cannot be accessed by the required parties, which will lead to operational malfunction. Due to operational malfunction employee's confidence and hospital reputation can be affected as well.		Reputation & Customer Confidence	9	4.5	
			Financial	9	4.5	
	Productivity can be reduced due to the fact of unavailability of employee data to the required parties. Safety of employee could be affected.		Productivity	8	4	
			Safety & Health	5	2.5	
			Fines & Legal Penalties	0	0	
User Defined Impact Area						
Relative Risk Score				15.5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A3.T6)				
Information Asset Risk	Threat	Information Asset	HR information management system			
		Area of Concern	A natural disaster can lead to loss of availability			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Natural			
		(2) Means <i>How would the actor do it? What would they do?</i>	A flood, a fire, an earthquake or a similar natural disaster could destroy the server room which hosts the database.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	accidental			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input checked="" type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Availability is affected because authorised parties could not access the system.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
	Hospital could be financially affected since the operations could be failed due to unavailability of the asset. Reputation also affected due to bad impression.		Impact Area	Value	Score	
			Reputation & Customer Confidence	8	2	
	Productivity could be affected since the required data is unavailable for the required parties to maintain the employees' data.		Financial	8	2	
			Productivity	7	1.75	
			Safety & Health	3	0.75	
Fines & Legal Penalties			0	0		
User Defined Impact Area						
Relative Risk Score					6.5	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A3.T7)				
Information Asset Risk	Threat	Information Asset	HR information management system			
		Area of Concern	External actor could harm the server hardware (Physical threat)			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	External malicious actor			
		(2) Means <i>How would the actor do it? What would they do?</i>	Actor could harm the server hardware which will destroy the server that runs the database.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input checked="" type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Availability could be lost due to destruction of the asset.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	A financial loss can be occurred since the employee information cannot be accessed by the required parties, which will lead to operational malfunction. Due to operational malfunction employee confidence can be affected as well.		Reputation & Customer Confidence	8	2	
			Financial	8	2	
	Productivity can be reduced due to the fact of unavailability of employee data to the required parties.		Productivity	7	1.75	
Safety of employee could be affected.		Safety & Health	4	1		
		Fines & Legal Penalties	0	0		
		User Defined Impact Area				
Relative Risk Score					6.75	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A4.T1)				
Information Asset Risk	Threat	Information Asset	Inventory management and drugs distribution system			
		Area of Concern	Inventory logs can be changed by an internal employee			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Internal employee			
		(2) Means <i>How would the actor do it? What would they do?</i>	Internal employee can accidentally change inventory logs in the database table.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Accidental			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity is violated due to modification of database logs which can affect hospital's operational procedures			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	A financial loss can be occurred due to modification of data because the system contains billing details of inventory items.		Reputation & Customer Confidence	9	4.5	
			Financial	8	4	
	Safety and health of patients could be affected because of a change in drug stock details. And productivity of the organisation can be affected as well.		Productivity	8	4	
			Safety & Health	6	3	
	Fines and legal penalties could be applied because of incorrect accounting details due to modification of reliable billing information		Fines & Legal Penalties	4	2	
		User Defined Impact Area				
Relative Risk Score					17.5	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A4.T2)				
Information Asset Risk	Threat	Information Asset	Inventory management and drugs distribution system			
		Area of Concern	Inventory logs can be changed by an external malicious actor			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Hacker			
		(2) Means <i>How would the actor do it? What would they do?</i>	External actor could change inventory logs in the database table for their personal gain.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input checked="" type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity is violated due to modification of database logs which can affect hospital's operational procedures			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High	<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> Low	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	A financial loss can be occurred due to modification of data because the system contains billing details of inventory items.		Reputation & Customer Confidence	9	4.5	
			Financial	8	4	
	Safety and health of patients could be affected because of a change in drug stock details. And productivity of the organisation can be affected as well.		Productivity	8	4	
			Safety & Health	6	3	
	Fines and legal penalties could be applied because of incorrect accounting details due to modification of reliable billing information. Fines and legal penalties could be applied if a patient's life is threatened due to a modification of medical supplies.		Fines & Legal Penalties	4	2	
		User Defined Impact Area				
Relative Risk Score				17.5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A4.T3)				
Information Asset Risk	Threat	Information Asset	Inventory management and drugs distribution system			
		Area of Concern	Availability of system can be lost because of a DDOS attack			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Hacker			
		(2) Means <i>How would the actor do it? What would they do?</i>	A DDOS attack can be carried out to crash the server containing the database.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Availability is lost due to unavailability of the database log for authorized parties. This can lead to cease operational procedures of the hospital.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	A financial loss can be occurred since the inventory logs cannot be accessed by the required parties, which will lead to operational malfunction. Due to operational malfunction customer confidence can be affected as well.		Reputation & Customer Confidence	6	3	
			Financial	8	4	
	Since hospital's operations are affected due to unavailability, productivity can be reduced.		Productivity	9	4.5	
Drug distribution is affected. Therefore, necessary medical items could not be available for patients.		Safety & Health	4	2		
		Fines & Legal Penalties	4	2		
		User Defined Impact Area				
				Relative Risk Score	15.5	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A4.T4)				
Information Asset Risk	Threat	Information Asset	Inventory management and drugs distribution system			
		Area of Concern	External actor could harm the server hardware (Physical threat)			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	External malicious actor			
		(2) Means <i>How would the actor do it? What would they do?</i>	Actor could harm the server hardware which will destroy the server that runs the database.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input checked="" type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Availability could be lost due to destruction of the asset.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	A financial loss can be occurred since the inventory logs cannot be accessed by the required parties, which will lead to operational malfunction. Due to operational malfunction customer confidence can be affected as well.		Reputation & Customer Confidence	8	2	
			Financial	6	1.5	
	Since hospital's operations are affected due to unavailability, productivity can be reduced.		Productivity	7	1.75	
			Safety & Health	4	1	
	Drug distribution is affected. Therefore, necessary medical items could not be available for patients.		Fines & Legal Penalties	0	0	
User Defined Impact Area						
Relative Risk Score				6.25		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A4.T5)				
Information Asset Risk	Threat	Information Asset	Inventory management and drugs distribution system			
		Area of Concern	A natural disaster can lead to loss of availability			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Natural			
		(2) Means <i>How would the actor do it? What would they do?</i>	An earthquake, a fire or a similar natural disaster can destroy the server room which hosts the database.			
		(3) Motive <i>What is the actor's reason for doing it?</i>	accidental			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input checked="" type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Availability is affected because authorised parties could not access the system.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Hospital could be financially affected since the operations could be failed due to unavailability of the asset.		Reputation & Customer Confidence	2	0.5	
			Financial	8	2	
	Productivity could be affected since the required data is unavailable for employees to carry out the drugs distribution and inventory logging procedures.		Productivity	9	2.25	
			Safety & Health	7	1.75	
			Fines & Legal Penalties	0	0	
User Defined Impact Area						
Relative Risk Score				6.5		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A5.T1)				
Information Asset Risk	Threat	Information Asset	Pacemaker System			
		Area of Concern	Deliberately reprogram the system that can disrupt the patient's heart rhythm			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Hacker/external user/internal employee (for personal gain – bribery)			
		(2) Means <i>How would the actor do it? What would they do?</i>	A hacker can reprogram the software and change the device algorithm from anywhere within the world			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input checked="" type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity is violated since system has been reprogramed			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input checked="" type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
		(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>		
				Impact Area	Value	Score
		Both reputations of the hospital and the manufacture company will plummet if a successful pacemaker hacking occurs. This will seriously affect the manufacture's finances more than the hospital		Reputation & Customer Confidence	8	4
				Financial	5	2.5
		The productivity of the system will be dangerous if it's hacked. The reprogram of the system could give severe bodily harm or kill the patient		Productivity	6	3
				Safety & Health	8	4
		if a life-threatening incident occur, there will be definite legal repercussions		Fines & Legal Penalties	7	3.5
User Defined Impact Area				6	3	
Relative Risk Score					20.0	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A5.T2)				
Information Asset Risk	Threat	Information Asset	Pacemaker – patient information database			
		Area of Concern	Disclosure of patient's sensitive information			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	External hacker or internal employee			
		(2) Means <i>How would the actor do it? What would they do?</i>	The actor would have to hack into or use already in possession authentication codes (internal employee) to get access to the patient information system			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input checked="" type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Confidentiality is violated since the patient information has been disclosed to unauthorised parties.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input checked="" type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
		(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>		
	Reputation will be severely damage and it can take a small toll on the finance if confidential data gets disclosed		Impact Area	Value	Score	
			Reputation & Customer Confidence	7	5.25	
	The actor can use this in a way that can harm patient's health or sell this information to another entity who intents to use the information in a harmful manner.		Financial	6	4.5	
			Productivity	5	3.75	
	If the maliciously disclosed information impacts negatively to patients, a financial compensation will be demanded and legal action might be taken by the patients		Safety & Health	6	4.5	
			Fines & Legal Penalties	4	3	
Relative Risk Score				21		

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A5.T3)				
Information Asset Risk	Threat	Information Asset	Pacemaker – patient information database			
		Area of Concern	Modification of patient information in database tables			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Internal employee			
		(2) Means <i>How would the actor do it? What would they do?</i>	An employee can unintentionally modify/delete an entry in the system			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Accidental			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity could be violated due to modification o patient data in database tables.			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Reputation might not be severely damage since there is a high possibility it might not be disclosed to the public, therefore there will be less finance toll.		Reputation & Customer Confidence	6	3	
			Financial	6	3	
	Productivity of the database might be less effective that before. It might be dangerous if the change/deletion of data is relating to the patient's health/medication		Productivity	5	2.5	
			Safety & Health	5	2.5	
If a life threatening situation occurred because of a modification in the database legal action might be taken.		Fines & Legal Penalties	4	2		
Relative Risk Score					13	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A6.T1)			
Information Asset Risk	Threat	Information Asset	Automated oxygen supply system		
		Area of Concern	Modification of oxygen supply level		
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Internal Employee		
		(2) Means <i>How would the actor do it? What would they do?</i>	An employee can accidentally change the oxygen supply settings		
		(3) Motive <i>What is the actor's reason for doing it?</i>	Accidental		
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption		
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>	Integrity and availability both could be affected		
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input checked="" type="checkbox"/> Low 25%
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>		
			Impact Area	Value	Score
	Reputation might or might not take a toll regarding this situation. The situation might take a small toll on the finance depending on the modification.		Reputation & Customer Confidence	9	2.25
			Financial	7	1.75
	The system will not work as it is indented to work and depending on the modifications it can be a health hazard as well		Productivity	9	2.25
			Safety & Health	9	2.25
	If a health problem or a life-threatening situation occurs due to this modification the hospital will have to take responsibility, and this can cause legal penalties and fines		Fines & Legal Penalties	7	1.75
Relative Risk Score				10.25	

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A6.T2)			
Information Asset Risk	Threat	Information Asset	Automated oxygen supply system		
		Area of Concern	Damage to the oxygen supply system due to natural disaster		
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Natural disaster		
		(2) Means <i>How would the actor do it? What would they do?</i>	A natural disaster damaging the oxygen supply system (machinery)		
		(3) Motive <i>What is the actor's reason for doing it?</i>	Accident		
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input checked="" type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption		
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>			
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input checked="" type="checkbox"/> Low 25%
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>		
			Impact Area	Value	Score
	Reputation might or might not take a toll regarding this situation. The system must be replaced or repair, therefore it will take a high toll on the financial area		Reputation & Customer Confidence	7	1.75
			Financial	9	2.25
	The system will not work as it is indented to work until the repairs and as a result, the health and safety of patients might be endangered		Productivity	8	2
			Safety & Health	9	2.25
If a health problem or a life-threatening situation occurs due to this distruction the hospital will have to take responsibility, and this can cause legal penalties and fines		Fines & Legal Penalties	7	1.75	
Relative Risk Score 10					

Allegro - Worksheet 10		INFORMATION ASSET RISK WORKSHEET (A6.T3)				
Information Asset Risk	Threat	Information Asset	Automated oxygen supply system			
		Area of Concern	Vandalising the oxygen supply pumps/generators			
		(1) Actor <i>Who would exploit the area of concern or threat?</i>	Internal employee/ external actor			
		(2) Means <i>How would the actor do it? What would they do?</i>	An actor can vandalise the oxygen supply systems (pumps/generator)			
		(3) Motive <i>What is the actor's reason for doing it?</i>	Deliberate			
		(4) Outcome <i>What would be the resulting effect on the information asset?</i>	<input type="checkbox"/> Disclosure <input checked="" type="checkbox"/> Destruction <input type="checkbox"/> Modification <input type="checkbox"/> Interruption			
		(5) Security Requirements <i>How would the information asset's security requirements be breached?</i>				
		(6) Probability <i>What is the likelihood that this threat scenario could occur?</i>	<input type="checkbox"/> High 75%	<input type="checkbox"/> Medium 50%	<input checked="" type="checkbox"/> Low 25%	
	(7) Consequences <i>What are the consequences to the organization or the information asset owner as a result of the outcome and breach of security requirements?</i>		(8) Severity <i>How severe are these consequences to the organization or asset owner by impact area?</i>			
			Impact Area	Value	Score	
	Effect on the organizations' reputation is low, however the cost of repairing or replacing the oxygen supply system is high		Reputation & Customer Confidence	6	1.5	
			Financial	9	2.25	
	The system can not be properly used until repairs/replacement is complete, therefore this affects the productivity of the system and also the health and safety of the patients		Productivity	9	2.25	
Safety & Health			9	2.25		
If a health problem or a life-threatening situation occurs due to this modification the hospital will have to take responsibility, and this can cause legal penalties and fines		Fines & Legal Penalties	7	1.75		
Relative Risk Score					10	