Using GS1 for health supply chain in disaster management

Dina Ziadlou

MS.Information Technology Engineering,Tarbiat modares University

dinaziadlou@gmail.com

17938 calvert st., Encino, ca91316, USA

ABSTRACT

Global Standard (GS1) provides the unique identification of all trade items, services, logistic units, consignments, assets, documents, relationships, parties and locations at any point in the supply chain and Logistic chain arrange preparation, maintenance, storage, distribution, transportation that needs adjustment and providing procedure, system design and guide line of observation. In this paper, for the first time has been suggested integration of the GS1 and Medical information technology systems in disaster management supply chain with the title of lean health management. With this approach army can improve the privacy of the medical information; tracing of medical assets and also human resources in disasters. Here, Lean health chain includes management of medical devices, pharmaceutical and blood products and human resources of army. In this method a common language based on GS1 has been designed for data base of m-health, Telemedicine and RFID, and also with this type of integration we can use intelligence wearable and microchips to monitor and transfer the vital signs of the soldiers securely in an emergency situation inside of tracing and tracking of equipments.

Key words: GS1, Health supply chain, telemedicine, army, disaster management

1. Introduction

Logistic is the part of supply chain management that is responsible to effectiveness and efficiency of forward and back ward of work flow among production to end user. Its aim supplies consumer request with planning and controlling of total actions. Logistic usually is used in supply chain of army and strategic value of it is in coding, identification, tracing and tracking of products.[3] one of the best way to achieve this object is using GS1(Global System 1) , GS1 can increase command and control of this area and in this paper GS1is suggested to health chain management [4] .

2. Relation between GS1 and Health supply chain management in army

GS1 was established at 1973 to extend and set up standards and world protocols to improve efficiency and clearness of supply chains.

In health area GS1 has seven objects:

1. Ability of effective recall
2. Access to secure supply chain
3. Traceability of blood supply , pharmaceutics and medical devices
4. Decreasing of supply chain cost
5. Prevent from errors and frauds
6. Creating common language in data base
7. Creating common language in data transferring [5]

In this paper, for the first time, it has been suggested to design a common language in infrastructure of telemedicine system, mobile health services, and Intelligence wearable and also microchips, we can have secure and intelligence data base based on GS1 in health management of army. [6]

GS1 has standards keys like:

1. Barcode
2. E Com
3. GDSN[1]
4. EPC global[2]

Barcode: Global standard for bar coding of data by identifier keys in GS1. It uses for automatic identification of assets, logistics, locations and people.

---

[1] Global Data Synchronization Network
[2] Electronic Products Classification

eCom : Global standards to transfer of electronically business information quickly and accurately .

GDSN: Global, standard and automatic environment that makes safe synchronize data and coherent information. All stack holders can have common information there GPC[3] is one of the GDSN component for classification of data.

EPC: Global standard for RFID[4] in infrastructure of network with electronic code to identify and tracing automatically. [5]

Figure 1. GS1 – global standard system

In this paper, by define health technology in GS1 for logistic of army (Military, Air force, Navy). We can achieve to higher efficiency, higher adroitness, accurate transferring, correct delivery, observing human rights, security of information, ability to set up accurate system with true combination and also create competitive advantage compare of other countries .Human resources are highest asset in an organization; so, to obtain lean health management and creating of secure health

information in supply chain are of the most significant factors . [7]

3. Classification of logistic supplies in Army

To use high technology in health and medical, we have ten classes that class 6 and 8 are included to human resources and, medical assets, they are our target to connect them to GS1 in this paper that offer for the first time.

Class I –rations and food supplies
Class II –general supplies
Class III –petroleum, oils, lubricants (POL)
Class IV –engineer and construction supplies
Class V –ammunition
Class VI –personal items
Class VII –major end items (trucks, tanks)
Class VIII –medical supplies and equipment
Class IX –repair parts
Class X –supplies for civil military support [6]

Here, intelligence wearable, RFID, Intelligence microchip, telemedicine systems and also, mobile health services are integrated based on GS1 in secure way with privet coding via internet. In figure2. is shown that all components that can connect to command and control center.

RFID and bar coding systems can use for identification of pharmaceutics , medical devices and blood supplies, telemedicine systems and m-health systems can use to transfer patients (soldiers and injuries) information to center . This information includes Heart Rate, SPO2, CO2, Blood Pressure, Respiration, Radiological images and ect.)

Intelligence microchip and wearable can use to save and transfer data of every person with traceability of them in disaster or war area. so, we face to huge medical information that need to be intelligence with secure way , and GS1 can do it .[8]GS1 in Health part has nine identifier based on integrated system and high security, these identifiers are:
GTIN[5],,GLN[6],SSCC[7],GRAI[8],GIAI[9],GSRN[10],GSIN[11],GINC[12],GDTS [13]

---

[3] Global Product Classification
[4] Radio Frequency Identification

[5] Global Trade Item Number
[6] Global Location Number
[7] Serial Shipping Container Code
[8] Global Returnable Asset Identifier
[9] Global Individual Asset Identifier

According to their capability will be done assets coding, information, person and location coding.[9]

Figure 2. Package for health chain in army via GS1

4. Intelligence Wearable

This system can ware by soldiers, and it has accessibility to human vital signs and transferring data to center .Their program can use set with GRAI in GS1.[2] Regarding to design of this intelligence wearable, they can detect location of person and for medical group and nurses in medical center in command center or pre hospital, also a problem accrue for soldier can transfer to center.[10]
GLN code is identifier code for location in GS1 that can use for coding of medical or command center to give tele consultation to triage group or pre hospital in disaster area/ war zone. [2]

---

[10] Global Service Relation Number

[11] Global Document type Identifier

[12] Global Identification Number For Consignment

[13] Global Shipment Identification Number

5. Intelligence micro chip

This kind of micro chips in this paper offer to design to set under skin of soldier with traceability and also writeable and readable performance. They should be biocompatible with human body with highest security code. [12] Information of them contain of person specification, blood type, history of diseases, allergy or special disease of that person. With GS1 can create capability to allocate a unique secure code in GDTI group. Considering to information security and privacy and medical ethics are the first step of using these devices. [10]

6. Radio Frequency Identification (RFID)

This technology was developed in 1940 by German army in unmanned air craft to transfer data in anywhere and anytime. [13] These systems have reader and tags with ability of tracing and detecting of assets code or person with wristband. Regarding to strategic plan of army in crisis and war, we have offered it based on GS1 in EPC part. [9] These tags attaché on blood supply box, medical devices, drugs with GTIN in GS1. GTIN is number commodity trading and readable by RFID. With describing of SSCC which is container of assets identification tracing of all components will be done. [14] On the other hand, GSRN is for communication services integrated with all data bases of transportation assets and also RFID codes for person. So, this combination is best to secure monitoring and secure transportation. [15]

7. Telemedicine systems

This technology is one of the last techniques in telecommunication and information technology for health and medicine to improve quality of care, increasing coverage of more people who need treatment everywhere of world. Also telemedicine can be used in disaster area to tele-consultation for injuries. [1]Here, it is suggested to add to health supply chain with GDSN and eCom in GS1 through data transferring and information integration. We able to give cod to hospital, pre hospital and also command center. [9] Unique code cause to special accessibility for commander in center. All patient information with telemedicine

systems come to center by secure way trough GDSN. [20]

8. Mobile health (m-Health) services

This technology uses for medicine actions and health care via telecommunication and multimedia. [2]In this paper intelligence micro chip and intelligence wearable and also triage groups and ambulances have been designed as part of health supply chain. So, with GS1, we can use XML protocol with ability of data transferring in information transfer layer. [16] Here it is offer that design of infrastructure of m-health services in decision making algorithm, voice and video streaming, SMS by GDTI in GS1 to have secure environment for transferring data. [17]

Vital sign of patients like ECG[14], heart rate, respiration, blood pressure, body temperature, ect., can transfer trough GDTI with lowest loss of signal or information from medical group ,triage team or ambulances and pre hospitals. Infrastructure of communication can be GSM[15], GPRS[16] or satellite. [2]

9. Discussion

In this paper, for the first time is tried to suggest a scenario for GS1 as pattern for health supply chain in army to have secure and guaranteed infrastructure for health information. [14] However , we have to predict to design structure of all component of this huge net work , secure data base , task of human resources , evaluate of quality of all performance. It needs that determine risk of this project to have lowest fault. In this implementation, we need to create suitable connection among army, medical group and GS1 companies. How to use of all devices in disaster or crisis and manage them. So, awareness and attitude of summit of army, administration group, and also supply budget of this project are high light points to do this project.

10. Results

Usage of GS1 in process of (blood products, medical devices, medicine) management ensure chain supply management.

---

[14] Electro Cardio Graph
[15] Global System for Mobile Communication
[16] General Packet Radio Services

For human resources in this chain will be create security and safety with privacy. Such that medicine in this health supplies chain result that:
-Correct patient   -Correct medicine
-Correct time   -Correct medication
For medical devices:
-Correct patient   -Correct location
-Correct device   -Correct use
-Correct Time
 It means that increase of safety and gain of human lives that is principal in organization like army.

References

[1] Ziadlou,D.(2009). *Design of telemedicine unit in structure of local crisis management.* Thesis of master degree, Tarbiat Modares University.
[2] Ziadlou,D.(2008) *Tele communication Systems and net work to transfer of medical information ,*Seminar of Tarbiat Modares University .
[3]Ziadlou,D.(2008).*Telecommunication Methods for Implementation of Telemedicine Systems in Crisis*, IEEE Journal, issue23,page 268-273 ,Nov.
[4]Ahson, S. A. (2008). *RFID Handbook: Applications, Technology, Security, and Privacy*. CRC 1st Edition .
[5]B., D. (2003). *How the US Military is Achieving Total Asset Visibility and More Using.* Smart Labels USA .
[6]Cheng Hsu, D. L. (2006).*Army medical logestics,* Patent No. SMCA04-11-0366-R2. New York.
[7]Elizabeth Avery Gomez, M. J. (2007). *Multiple Communication Options for Crisis Response: SMS Text-. 6th Annual ISOnEworld Conference* (pp. 41-48). las vegas: ISOnEworld Conference.
[8]Fitzpatrick, J. C. (2002). *Defense Medical Logistics Standard Support (DMLSS) Program: A DoD Medical Logistics Success Story. American Academy of Medical Administrators.*
[9]GS1. (2010). *AIDC Healthcare implementation guide.* GS1 ,HEREBY DISCLAIM.
[10]GS1. (2012). *GLN in Healthcare Implementation Guide.* France: GS1.
[11]GS1. (2012). *GS1 General Specifications. Australia*: GS1.
[12]GS1. (2009). *GS1 Global Traceability Standard for Healthcare (GTSH)Implementation Guide.* GS1.
[13]GS1. (2010). *The GS1 System of standard at work. Belgium:* GS1.
[14]Reimer, G. D. (2009). *Army Medical Logistics.* Washington DC: Departman of Army.
[15]schoomaker, P. J. (2005). *Medical logestic policy.* Washington DC.: US army.
[16]Aksoy, O. (2009). *Telemedicine Patient Identification with RFID.* newyork: Rochester Institute of Technology.
[17]Horwood, J. (2008). GS1 *Mobile Com Intro & Update.* (www.gs1.org/mobile/) pages 24 - 27: GS1 Mobile Com White Paper .
[18]Ralf W. Seifert, G. M. (2007). *Applications of RFID in Supply Chains*. Springer .

[19]Ziadlou, D.(2008). *Telecommunication Methods for Implementation of Telemedicine Systems in Crisis,* book" Advances in broad band and communication and network"- published by: River Publisher, Denmark, ISBN: 9788792329004

[20]DeLong B, (2003) *How the US Military is Achieving Total Asset Visibility and More Using RFID and MEMS*, Presentation, Smart Labels USA, Cambridge, MA.