



SAVONIA

AMMATTIKORKEAKOULUTUTKINTO

SOSIAALI-, TERVEYS- JA LIIKUNTA-ALA

COMPARING EMERGENCY MEDICAL SERVICES AND PARAMEDIC EDUCATION BETWEEN FINLAND AND ENGLAND

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Koulutusohjelma Sosiaali- ja terveysalan kehittämisen ja johtamisen koulutusohjelma	
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Työn nimi Comparing emergency medical services and paramedic education between Finland and England	
Päiväys 26.8.2014	Sivumäärä/Liitteet 73
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Toimeksiantaja/Yhteistyökumppani(t)	
Tiivistelmä <p>Tämän tutkimuksen tarkoituksena oli edistää Savonia ammattikorkeakoulun ja Liverpool John Moores Universityn välistä ensihoitajaopiskelijoiden vaihto-ohjelmaa. Tätä tarkoitusta varten vertailtiin kyseisten koulujen ensihoidon opetussuunnitelmia sekä oleellisen taustatiedon saamiseksi Suomen ja Englannin ensihoitojärjestelmiä.</p> <p>Tutkimuksessa vertailtiin ennalta määritellyjä aiheita sekä ensihoitojärjestelmien että ensihoidon koulutusohjelmien välillä. Tutkimusmateriaalina käytettiin virallisia kirjallisia dokumentteja, minkä lisäksi joitakin aiheita tarkennettiin haastatteluilla. Tutkimusmetodina käytettiin avointa kuvailevaa metodologiaa, jotta saatiin kattava kuvaus koko aiheesta.</p> <p>Tutkimuksessa löydettiin eroja sekä ensihoitojärjestelmissä että ensihoidon koulutusohjelmissä. Suurimmat erot ensihoitojärjestelmissä liittyivät palveluntarjomalliin sekä hätäpuhelun käsittelyyn. Ensihoidon koulutusohjelmat olivat kaikkiaan hyvin erilaiset. Englannissa kaksivuotinen koulutus sisälsi vain ensihoidon opintoja ja johti rekisteröintiin ensihoitajana. Suomalainen nelivuotinen koulutusohjelma sisälsi hoitotyön koulutusohjelman ja ensihoitajat rekisteröitiin sairaanhoitajiksi.</p> <p>Tutkimuksen tulokset auttavat Savonia ammattikorkeakoulua sekä Liverpool John Moores Universityä kehittämään ensihoitajaopiskelijoiden vaihto-ohjelmaa. Tuloksia voidaan käyttää benchmarking tyyliseen koulutusohjelmien ja opetussuunnitelmien kehittämiseen. Tutkimus toimii myös Suomen ja Englannin ensihoitojärjestelmien ja ensihoidon koulutusohjelmien esittelyinä. Täten vaihto-ohjelmaan osallistuvat ensihoidon opiskelijat saavat tutkimuksesta hyödyllistä tietoa, samoin kuin myös muut aiheesta kiinnostuneet.</p>	
Avainsanat Ensihoitojärjestelmä, ensihoitaja, ensihoidon koulutus, vertaileva tutkimus, Suomi, Englanti	

Field of Study Social Services, Health and Sports			
Degree Programme Management and Development Education programme for Healthcare professionals			
Author(s) Matias Rasi			
Title of Thesis Comparing emergency medical services and paramedic education between Finland and England			
Date	26.8.2014	Pages/Appendices	73
Supervisor(s) Sinikka Tuomikorpi			
Client Organisation /Partners			
<p>Abstract</p> <p>The aim of this research was to promote the exchange programme of student paramedics between Savonia University of Applied Sciences and Liverpool John Moores University. To reach this aim the curricula of the paramedic programmes in these institutions were compared. The emergency medical services were also compared between Finland and England to provide essential additional information.</p> <p>The research was conducted by comparing pre-determined subjects in both emergency medical services and paramedic programmes. The research material consisted of official written documentation and some clarifying interviews. An open descriptive research method was chosen to produce all-round comprehensive overview on the topics.</p> <p>The research succeeded in finding differences in both emergency medical services and paramedic programmes. The biggest differences in the emergency medical services were in the service provision models and emergency call handling. The paramedic programmes were altogether very different. In England the two-year programme consists of only paramedic studies and leads to registration as a paramedic. The Finnish programme is a four-year programme with integrated nursing studies that leads to registration as a nurse.</p> <p>The results of this research help both Savonia University of Applied Sciences and Liverpool John Moores University in developing the student paramedic exchange programme. The results can be used to benchmark elements of the programmes and curricula. This research works also as an introduction to the emergency medical services and paramedic education in both countries. Thus it provides useful information for the student paramedics participating in the exchange programme and for the wider audience as well.</p>			
Keywords Emergency medical services, paramedic, paramedic training, comparative research, Finland, England			

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1 PREFACE

Internationality and international relations are seen as an important and integral part of any field of work today. And it is not just about the appearances. International partnership can give valuable ideas on how to develop one self and new contacts to reach new markets. The old proverb that a wise man learns by another man's mistakes fits perfectly into any partnership – national or international.

Liverpool John Moores University is one of four strategic partners of Savonia University of Applied Sciences. This partnership is new but has already produced a benchmarking project in co-operation between Savonia University of Applied Sciences, Liverpool John Moores University and North Karelia University of Applied Sciences. (Aho et al 2012, 5 – 6.)

Liverpool John Moores University has another partner institution in Toronto, Canada. In their experience international educational partnership and student exchange benefits both students and institutions themselves. Students get memorable experiences that they can use in their studies and at work. Institutions get a possibility to reflect their methods and curricula to refine them. In the end this can benefit the service users as well. (Jones & McGillis 2013.)

One aim of the partnership between Savonia and Liverpool John Moores University is to begin the exchange of student paramedics. This research promotes and supports this aim by comparing the curricula of the courses in both institutions. The aim of this research is that it gives information and ideas for both institutions to deepen the partnership in the field of paramedic practice.

Comparing just the curricula without any cultural context could raise a lot of questions. Thus the emergency medical services will also be compared. Comparing both the emergency medical services and the curricula of these partner institutions makes the research more useful for both involved parties and a wider audience as well. The research can be used as an introduction to emergency medical services and paramedic education in both countries.

DEFINING CONCEPTS

Comparing two differing systems of emergency medical services and education in two languages requires some definition of the concepts used. Where it is possible, official names and terms used by concerning parties will be used. Some main concepts are however named differently in the two universities. For the purpose of clarity and understandability common names for these concepts will be used.

Emergency medical services term will be used for the system of managing medical emergencies outside of hospital environment. This includes emergency call centres and dispatch, first response system, emergency care given by trained medical personnel outside of hospital and transportation of emergency patients to hospital or between hospitals. Term equals to the Finnish concept *ensihoito* and is also equivalent to term *pre-hospital emergency care*.

Paramedic practice term is used as the name of higher education course or programme for training medical personnel to pre-hospital emergency care. Especially in Finland the English translations of *ensihoidon koulutusohjelma* vary greatly.

Paramedic refers to a person with a higher-level education in pre-hospital emergency care. Paramedic usually works in an advanced life support ambulance. In some instances other description is used to distinguish the Finnish *ensihoitaja* or a person who has completed *ensihoidon koulutusohjelma* from the English paramedic.

Basic life support and **advanced life support** are used to describe the two levels of care in pre-hospital emergency care. The Finnish equivalents are *perustason ensihoito* ja *hoitotason ensihoito* although some differences in these concepts exist. These differences are described more thoroughly where the distinction is needed.

Higher education means tertiary level of education in both countries. Higher education is provided in **higher education institutions**, usually universities.

Emergency driving refers to driving whilst on a call where a patient's condition is considered so serious that the destination has to be reached faster than what other traffic allows. This includes using blue lights and usually a siren.

2 EMERGENCY MEDICAL SERVICES AND PARAMEDIC EDUCATION IN FINLAND

2.1 Emergency medical services in Finland

2.1.1 History and development

The first municipally organised transport of the ill and injured in Finland was started in Turku in 1901. Helsinki followed the example in 1905. In both places the responsibility was given to the fire departments. At that time the methods of transport included horse-drawn carriages, push carts and bicycle carts. In the winter the carriages could be fitted with sleighs. (Järvinen 1998, 30 – 31.) Helsinki got its first motorised ambulance in 1923, Oulu in 1926 and Turku in 1928. At this time there was no organised patient transport outside main population centres. (Järvinen 1998, 47 – 54.)

The Second World War drew most of ambulances and personnel to the use of military forces. The transport of injured and sick civilians remained a responsibility of the fire departments in only the largest towns and cities. Even in those places the transports were restricted because of bombings and shortage of fuel. (Järvinen 1998, 59 & 81.)

In the 1953 only 74 of Finland's 486 municipalities had an organised patient transport system and even in those there were no standards of who to transport and how. There was no equipment to treat the patient to speak of and training for the personnel was non-existent. The only party that was interested in developing the system was the Finnish Red Cross. (Järvinen 1998, 89 – 90.)

The Finnish Red Cross started many ambulance services in the rural areas in the 1950s and mostly voluntary forces ran them. In some rural areas private entrepreneurs started transporting patients alongside another transport business. (Järvinen 1998, 100 – 101 & 120.) The Association of Finnish Ambulance Entrepreneurs was founded in the 1964. At this point Red Cross or military first aid training was considered a sufficient – but by no means mandatory – training for the ambulance staff. (Järvinen 1998, 132 – 133.)

Things really took a step forward in the 1972 when the new Public Health Act defined the transport of the ill and injured for the first time legally. The municipalities were given the responsibility to organise the patient transport themselves, in co-operation with the local fire department or to buy the service from a private service provider. (Järvinen 1998, 161 & 186 – 187.)

At the same time an official training was commenced for the ambulance staff. The beginning of the course was not easy. Starting with the horrific name, lääkitävahtimestari-sairaankuljettaja, the course was not very well received at first. (Järvinen 1998, 184 – 185.) It was however the only official training for the ambulance work until the early 1990s.

In the 1984 the new Act on Fire and Rescue Services defined the role of emergency response centres and paved the way towards today's unified emergency response centres. At the first stage fire

and ambulance call handling was put together. The municipalities gave the response guidelines to the centres, as they were still responsible for the service. (Järvinen 1998, 262.)

In the 1985 a committee was formed to discuss the pre-hospital care. No legally binding results were found but the discussion about basic and advanced level of care became alive in form of number of advanced level courses. (Järvinen 1998, 267 – 271.) At the same time the pre-hospital care developed especially in Helsinki. Intubation, intravenous cannulation, defibrillation and even CPAP treatment had become everyday therapies. There were no official guidelines and physicians used these therapies as they would and staff with less education after consulting the physician. (Järvinen 1998, 274 – 276.)

In the beginning of 1990s the previous technician level training of lääkitävahtimestari-sairaankuljettaja was stopped. The training was integrated into a new vocational diploma level training of health care professionals as one of many specialisation courses. Higher education in paramedic practice leading to advanced level care started in 1998. (Määttä 2013, 16.)

2.1.2 Service providers

JOINT MUNICIPAL AUTHORITIES FOR HOSPITAL DISTRICTS

Health Care Act 2010 (1326/2010) lays foundation for provision of emergency medical services in Finland. It states that it is the responsibility of joint municipal authorities for hospital districts to provide medical emergency services in their area. The joint authorities have to produce a 'service standard decision', which indicates at least the service standards, qualification requirements for the personnel and response time targets. The law also gives authority to the Ministry of Health and Social Affairs to specify the requirements for medical emergency services on a decree.

The Ministry of Health and Social Affairs' Decree on Emergency Medical Services gives more accurate requirements for executing the Health Care Act. The decree gives responsibility to specialised Emergency Medical Services Centres for organising the emergency medical services within their catchment area for highly specialised care. The Decree also states the minimum education requirements for the personnel on both basic and advanced level of paramedic practice. (D 340/2011.)

Currently there are 21 hospital districts in Finland. For highly specialised care they are divided into five catchment areas, each with its own university hospital. Each catchment area provides highly specialised care for approximately one million people. (Sosiaali- ja terveystieteiden ministeriö 2013.) Although the responsibility for providing health care services in Finland stays with municipalities, the plan of action of the government for its planned term strives for stronger municipalities and health care areas. (Finnish Government 2011, 97 – 98.)

As stated before, the responsibility for providing emergency medical services falls to the hospital districts. They can produce the service on their own, in co-operation with another hospital district or

fire service, or acquire the service from third party service provider, such as private ambulance company. The law states that the emergency medical services within a catchment area of highly specialised care have to be co-ordinated and consolidated. In practice this means that emergency medical services centres have been founded into all five university hospital districts to execute this co-ordination. (Sosiaali- ja terveystieteiden ministeriö 2013.)

OTHER SERVICE PROVIDERS

Outside of the main population centres and in non-emergency patient transfer private service providers are predominant. Because of constant tendering of services accurate statistics are not available about the division of service providers. The Finnish Association of Ambulance Entrepreneurs estimates that around 40 % of all ambulance missions are run by a private service provider, 40 % by a fire service and 20 % by hospital districts on their own service. (Söderlund 2013.)

Although the same guidelines provided by the hospital districts bind all service providers, there are differences between them as well. For example the collective labour agreement is different in public and private health care sector. This brings differences in salary, working hours, compensation for social hours and vacations.

FinnHEMS is a corporation formed by all of the five university hospital districts in Finland. It was founded in 2011. Before FinnHEMS the helicopter medical emergency services in Finland were run by voluntary charities with both public and private funding. The medical personnel is provided by the university hospitals. Today with FinnHEMS all units are under the same governing body and are funded from the state budget. (FinnHEMS 2014.)

FinnHEMS operates from five bases with a physician always on board and from one base with a paramedic. In addition to a physician or paramedic, all aircrafts have one pilot and one HEMS paramedic with special training to assist the pilot in flight operations. The helicopter emergency medical services units are dispatched under certain criteria by the emergency response centre. (FinnHEMS 2014.)

In addition to helicopter operations the units also respond to emergencies by land vehicle if the weather does not allow flight operations or the incident is close by. Physicians also answer to consultations made by other emergency medical services units in their area and act as medical leaders in mass casualty incidents.

2.1.3 Provided service

SERVICE STANDARD DECISION

The joint municipal authorities for hospital districts provide their district with a service standard decision for the pre-hospital emergency care. The purpose of the service standard decision is to equalise

the provision of emergency medical services throughout the district and country. (Sosiaali- ja terveystoimi 2011, 9.)

Predicting the need for emergency medical services is done by dividing the whole district into one square kilometre hexagons. Each of these hexagons is coded into one of five categories according to the predicted need of emergency medical services. These risk categories are shown in the table below.

TABLE 1: Service standard decision risk categories (Sosiaali- ja terveystoimi 2011, 15.)

Cate- gory	Definition	Example
1	More than one call per day	Town centre
2	More than one call per week but less than one per day	Town suburb or centre of a small town
3	More than one call per month but less than one per week	Rural population centre
4	Less than 10 calls per year but has permanent residents or a major road	Rural area
5	Uninhabited area or outside main road network	Forests, areas of water, islands with no roads or bridges

The service standard decision has to tell what percentage of A and B urgency calls have to be reached within eight and 15 minutes inside each risk area. It also tells what percentage of C urgency calls have to be reached in 30 minutes and D urgency in two hours. The time is measured from the time when the units have been dispatched until the first unit is in the destination. Certain calls require advanced life support unit's attendance and thus the percentage of calls reached within 30 minutes by an advanced life support unit is also measured. (Sosiaali- ja terveystoimi 2011, 16.)

In addition to the actual ambulance service the service standard decision also includes the use of first response units and units staffed with a physician. The decision has to give instructions on the daily management and leadership of the emergency medical services. (Sosiaali- ja terveystoimi 2011, 17 – 19.)

The minimum training requirements for the personnel in the emergency medical services is set in the associated act and decree. The hospital district can elaborate these requirements in the service standard decision. Especially it has to take a stance on the training requirements set for the first responders and physicians working in the field. (Sosiaali- ja terveystoimi 2011, 22.)

The hospital district determines the use of the emergency medical service units. This is why it has to give the Emergency Response Centre guidelines about which units respond to which calls. This

means that the operator makes the risk assessment and then dispatches the units according to a pre-set template. The service standard decision also has to include guidelines about the co-operation between the authorities within the area of operations. (Sosiaali- ja terveystieteiden ministeriö 2011, 23 – 26.)

Finally the service standard decision includes the template for recording and reporting all the details in the decision. This standardised reporting produces valuable information that can be used to develop the emergency medical services in the district and also throughout the country. (Sosiaali- ja terveystieteiden ministeriö 2011, 27.)

TIERED RESPONSE

Emergency medical services in Finland are activated by the Emergency Response Centres. The response is four tiered with first response system, basic level ambulance, advanced level ambulance and physician-led helicopter emergency medical services. (Määttä 2013, 17.)

First response system is in place to minimise response time to life threatening incidents. Many smaller municipalities and communities do not have their own ambulance station. Instead they have a first response unit in co-operation with the local voluntary fire department. The first response units have to have at least two persons that have undergone first response training and the unit has to have a contract with the joint municipal authority that is responsible for organising emergency medical services.

The Health Care Act and associated decree on emergency medical services do not take a stance on the actual care given on basic and advanced level life support. Care on both levels evolves and the guidelines are given locally. According to the World Health Organization (2008b, 63) two thirds of ambulances in Finland were basic life support units and one-third advanced units. The personnel working in the unit determine its level. Some advanced level units have two paramedics and some have one paramedic and one other health care professional or a fire fighter (Määttä 2013, 23).

All hospital districts have to have personnel for managing and supervising daily activities in emergency medical services. Effectively they are paramedics with additional training in leadership and management. In addition to working as an advanced life support unit, their responsibility is to organise the use of units in calls with multiple units. They also support the emergency response centre in organising the work if the need for service exceeds the capacity. (Määttä 2013, 25.)

Physicians participate in the operational work throughout Finland. There are some minor variations in different areas but all regions have an on-call physician. In the largest part of Finland a physician works in an ambulance helicopter. Helsinki also has its own physician ground unit. A physician responds to the most critically ill calls and answers to consultations from paramedics. Physicians also have a strong administrative and guiding role in pre-hospital emergency care. (Määttä 2013, 24.)

PERSONNEL IN PRE-HOSPITAL EMERGENCY CARE

Until the new Health Care Act in 2010 there were no official qualification requirements for employees in emergency medical services in Finland. After the transition time only health care professionals and fire fighters can work in the emergency medical services. Personnel in first response units do not have to be health care professionals but do have to have an appropriate training. (D 340/2011, 8§.)

In basic life support the minimum training requirement is that one of the crew has to have the vocational qualification in health care specialised in emergency care. The other of the crew can be either another health care professional or a fire fighter. (D 340/2011, 8§.)

In advanced life support at least one of the crew has to have a bachelor's degree in paramedic practice or a degree in nursing with an additional specialisation course in paramedic practice. The other member of the crew has to be either a health care professional or a fire fighter. (D 340/2011, 8§.)

Hospital districts have personnel called *kenttäjohtaja* whose responsibility is to lead and manage daily operations of emergency medical services in their area. This personnel has no official training requirements but they are experienced paramedics quite often with additional training in management and leadership.

Before the new law employees with a degree in nursing without specialisation in paramedic practice were numerous in the field. The new legislation still allows them to work in an ambulance but only as a pair to employee with vocational qualification in health care specialised in emergency care on the basic level and employee with degree in paramedic practice on the advanced level. There is no data about the qualifications or their distribution in Finland.

Finnish fire fighters graduating from Emergency Services College also undergo paramedic practice course of 30 ECTS credits (Emergency Services College 2014a.) Fire fighters are not health care professionals, but they can work alongside a health care professional in an ambulance.

Emergency medicine is not an official medical speciality in Finland. Most physicians working in the emergency medical services are specialised or specialising in anaesthesia. There is also an accreditation programme in emergency medicine approved and operated by the Finnish Medical Association. (World Health Organisation 2008b, 65.)

Salaries for emergency medical services in Finland are not readily available. Public service providers keep records of the salaries, but because of unstandardized training and job descriptions there are multiple different names for the job. Data from the private sector is not publicly presented. It is also not possible to tell apart personnel working on a basic or on an advanced level from the salary tables. Most common job name in the public service is *Ensihoitaja*, whose total earnings per month is 3,369 € (Kuntatyönantajat 2013).

PROCEDURES IN PRE-HOSPITAL EMERGENCY CARE

There are no official national guidelines for the procedures performed in the pre-hospital emergency care. Ensihoito-opas (Silfvast, Castrén, Kurola, Lund & Martikainen 2009) gives guidelines for pre-hospital emergency care and is widely accepted as the official reference book for guidelines. Joint municipal authorities for hospital districts are responsible for producing their own guidelines and they can differ according to local circumstances.

TABLE 2: Airway management (Kurola 2009, 380 – 387.)

	Basic level	Advanced and physician level
In resuscitation	LMA/LT(IGel)	Intubation
Unconscious patient	Bag-mask ventilation	Intubation/LMA/LT(IGel)
Obstructed airway	-	Cricothyroidotomy

The use of IGel is found in the latest editions of reference books even if it is not mentioned in the used reference.

TABLE 3: ECG and arrhythmia treatment (Kurola 2009, 387 – 389.)

	Basic level	Advanced and physician level
13-lead ECG	Send to a physician	Interpretation
VF/VT in resuscitation	AED	AED
Cardioversion	-	+
Transcutaneous pacing	-	+

In the basic life support the employees are commonly expected to be able to take 13 lead ECG, transmit it to a physician and act according to instructions. This may vary regionally. On the advanced level the paramedics should be able to independently interpret the ECG and transmit it to a physician if needed. This could be for example to determine the best treatment for AMI or arrhythmia.

TABLE 4: Other procedures (Kurola 2009, 205 & 389 – 390.)

	Basic level	Advanced and physician level
Intraosseal access	(+)	+
Needle thoracocentesis	-	+
CPAP	(+)	+

Intraosseal cannulation is not commonly used in the basic life support. However in the latest books it is being taught and could become commonly accepted as a basic life support procedure in the near future. The use of CPAP is in the basic life support guidelines in some regions but not in all of Finland.

MEDICATION IN PRE-HOSPITAL EMERGENCY CARE

Joint municipal authorities for hospital districts are responsible for medication guidelines for pre-hospital emergency care. This means that there are no national guidelines and local authorities might have slightly different sets of medication in use. Ensihoito-opas (Silfvast et al 2009) gives guidelines for commonly used medications in the pre-hospital emergency care.

In Finland a physician has to prescribe all prescription medication to patients. In pre-hospital emergency care this is handled through written guidelines. This means that in certain pre-described situations paramedics can administer medication without a specific prescription. In most places paramedics also have a possibility to call a physician for prescriptions or other guidance.

TABLE 5: Medication in basic life support (Silfvast 2009, 395 – 416.)

Name (adm. route)	Indications
Aspirin (p.o.)	Chest pain
Activated charcoal (p.o.)	Intoxication
Adrenaline (i.v. / i.m.)	Resuscitation, anaphylaxis
Broncholyte inhalations (inh.)	Asthma
Diazepam (p.r.)	Convulsions
Glucagon (i.m. / s.c.)	Hypoglycaemia
Glucose (i.v.)	Hypoglycaemia
Nitrate (p.o.)	Chest pain, pulmonary oedema
Oxygen (inh.)	Breathing difficulty, chest pain, asthma, resuscitation
Paracetamol (p.o. / p.r.)	Febrile convulsions

The list of medications in basic life support is relatively long. All medications are for emergency situations, namely resuscitation, chest pain, breathing difficulty, hypoglycaemia and convulsion. The administration route is natural where it is possible. This set of medication is probably thought to be the most effective with basic life support training and with fewest unfavourable effects. Rectal administration route for diazepam is currently changing to buccal administration.

TABLE 6: Medication in advanced life support (in addition to the medication in BLS) (Silfvast 2009, 395 – 416.)

Name (adm. route)	Indication
Adenosine (i.v.)	SVT
Adrenaline infusion (i.v.)	Hypotension
Alfentanil (i.v.)	Pain relief, sedation
Amiodarone (i.v.)	Resuscitation
Antiemetic (granisetron etc.)(i.v.)	Nausea and vomiting
Atropine (i.v.)	Bradycardia
Clopidogrel (p.o.)	Chest pain with special indications
Corticosteroid (i.v.)	Allergic reaction, anaphylaxis
Diazepam (i.v.)	Convulsions, sedation
Dopamine infusion (i.v.)	Hypotension
Enoxaparin (i.v. / i.m.)	Chest pain with special indications
Fentanyl (i.v.)	Pain relief
Flumazenil (i.v.)	Intoxication
Furosemide (i.v.)	Pulmonary oedema
Midazolam (i.v.)	Sedation
Morphine (i.v.)	Pain relief
Naloxone (i.v. / i.m.)	Opiate overdose
Nitrate infusion (i.v.)	Chest pain, pulmonary oedema
Oxycodone (i.m.)	Post partum haemorrhage
Retepace (i.v.)	AMI with special indications
Sodium bicarbonate (i.v.)	Metabolic acidosis
Tenecteplase (i.v.)	AMI with special indications

The set of medication commonly in use in advanced life support. It covers a range of medical emergencies with an emphasis very much on the treatment of chest pain and acute myocardial infarction.

TABLE 7: Physician only medication (Silfvast 2009, 395 – 416.)

Name (adm. route)	Indication
Etomidate (i.v.)	Anaesthesia
Ketamine (i.v.)	Anaesthesia, pain relief
Propofol (i.v.)	Anaesthesia
Rocuronium (i.v.)	RSI
Succinylcholine (i.v.)	RSI

The list of physician only medication is rather short. It also has only medication for anaesthesia and rapid sequence induction. The units with a physician are known to have more extended, locally determined set of medication.

FEES AND FINANCES

Finnish public health insurance compensates the majority of the costs of emergency medical services. Rather than compensating the actual expenses, it pays the service provider compensation according to the time used and kilometres driven on each call. The service user pays a fee of 14.25 € for each call regardless of the time used, the length of journey or the procedures or medications given. The expenses of the helicopter emergency medical services are covered with the state budget. (Määttä 2013, 20.) Currently the whole finance system is being revised.

2.1.4 Emergency calls and emergency response centres

Finland uses the European Union emergency telephone number 112 as the only number for emergency calls. The Emergency Response Centre Administration is a national institution handling all emergency calls, dispatch and communications between police, fire services and social and health care providers (Ministry of Interior 2013). It works under direct supervision of Ministry of the Interior. There is a major reform of the institution currently underway with new Act on emergency response centre activities introduced in 2011. After the reform is completed in 2014 there will be six Emergency Response Centres in place of former fifteen. (Hätäkeskuslaitos 2014.)

In the year 2012 the Emergency Response Centre received 4.1 million calls of which around 934.000 concerning medical emergencies. From these calls, 753.000 led to dispatch. It is noteworthy to mention that from the total calls that were made almost one million did not concern emergencies and 160.000 were hoax or prank calls. (Hätäkeskuslaitos 2013, 11.)

Call answering target time is to answer 90 % of calls in 10 seconds and 95 % in 30 seconds. These targets were achieved the percentages being 92 and 97 respectively. Target dispatch times have also been set for each call categories. These times are usually 90 or 120 seconds for emergencies. Target dispatch times are met only in approximately half of calls and thus it is set as one key aims for 2013 to tackle this problem. (Hätäkeskuslaitos 2013, 5 & 12.)

The operators assess the emergency calls using computerised risk assessment program. Calls are categorised from A to D according to the level of emergency. Level A means that according to the call patient has life-threatening condition requiring immediate medical attention. On level B person has a serious condition and immediate threat to life cannot be ruled out. Level C meant that person's condition is serious but not life threatening. Level D means non-emergency. Categories A and B mean immediate response and that emergency driving is needed. Hospital districts decide the response times for each category in the service standard decisions. (D 340/2011, § 6 – 7.)

The national Emergency Services College provides education and training of the Emergency Response Centre Operators in co-operation with the Police College. The course consists of 90 ECTS credits and takes one and a half years to complete. In addition to answering emergency calls and

dispatch operation, the operators also advise callers on first aid or other actions if needed. (Emergency Services College 2014b.)

Communications between the Emergency Response Centres and authorities including Emergency Medical Services, police, fire brigade, social services, military emergency departments is conducted via separate radio network called Virve. It is a digital secure network for both voice and data communications, although because of the technology currently in use the data transfer capacity is very limited, only 4.7 Kbit/sec. The service and network is provided and kept up by a state-owned State Security Networks Ltd. (State Security Networks 2014.)

2.1.5 Regulation

The Act on Health Care Professionals has been set to promote and improve patient safety. The Act states who can act as health care professionals in Finland, regulates their registration and issues authorities with responsibility for overseeing health care professionals. The act also states key responsibilities of health care professionals. Main responsibility is to uphold health, prevent and treat illness and alleviate suffering of service users. Other responsibilities are to uphold patient rights, create and store patient records as is stated in the concerned act, maintain confidentiality and finally to maintain skills and knowledge needed in the profession. (A 559/1994.)

All health care professionals have to apply for registration from the National Supervisory Authority for Welfare and Health (Valvira 2014). The requirement for registration is that the applicant has completed studies and graduated from an acknowledged educational institution. Once the application has been approved there are no requirements for staying registered. Valvira can cancel the registration or place restrictions for practice if the professional is not for practice.

There are six Regional State Administrative Agencies in Finland. They are responsible for directing and overseeing health care services, among many other things, in their geographical area. They also grant licences for private health care professionals or organisations to provide health care services and handle complaints against health care providers. They work under guidance of Ministry of Social Affairs and Health and in co-operation with other agencies, such as Valvira. (Regional State Administrative Agencies 2013.)

2.2 Education of paramedic practice in Finland

2.2.1 Education system in Finland

Basic education starts usually at the age of seven, preceded by pre-primary education. Basic education is provided by municipalities and takes nine years to finish. Upper secondary education is divided into two pathways: general upper secondary education leading to Matriculation Examination and upper secondary vocational education and training leading to vocational qualifications. Both pathways take usually three years to complete. (Ministry of Education and Culture 2012.)

Higher education in Finland consists of two different pathways: universities and polytechnics. Universities provide scientific education and research activities. Polytechnics are institutions of professional higher education and in addition produce applied research and development. Both pathways have a common basic entry requirement of completion of either of upper secondary education pathways or a foreign qualification of the same level. Finnish higher education uses European Credit Transfer System. (Ministry of Education and Culture 2012.)

Instead of the official term polytechnic, The Rectors' Conference of Finnish Universities of Applied Sciences recommends the use of university of applied sciences. (Arene 2007.)

Application to higher education is done with an internet services provided by Finnish National Board of Education and it is free of charge. Entry requirements vary but completion of secondary education is a minimum requirement. Quite often universities use entrance examinations in addition to requirements in previous qualifications. Most universities of applied sciences use common recommendations for general requirements. Scientific universities have their own entry requirements. (Finnish National Board of Education 2013.)

University education has three levels of degrees that are compatible with cycles of the European Higher Education Area. The first is Bachelor's degree with minimum of 180 ECTS credits. The second degree is Master's degree with 120 ECTS credits. Most students take master's degree with bachelor's degree only as a titular step in between. (Ministry of Education and Culture 2012.)

The third cycle aims usually straight at doctor's degree, although licentiate's degree can be awarded in between. Doctoral studies do not have pre-set amount of credits but certain studies have to be completed in addition to research based doctoral dissertation. (Ministry of Education and Culture 2012.)

Universities of applied sciences have two levels of education equivalent to the first two cycles of European Higher Education Area. First level leading to bachelor's degree consists of 180, 210, 240 or 270 ECTS credits. Second level grants master's degree with 60 or 90 ECTS credits worth of studies. (Ministry of Education and Culture 2012.)

Higher education in Finland is free for the students. Tertiary education is mainly publicly funded. Universities are either public institutions or trusts and they are very independent in using their funding. Approximately 64 % of funding comes directly from the Ministry and the rest from sponsors, donations and various fees. (Ministry of Education and Culture 2014a.)

Municipalities or joint authorities run most of the universities of applied sciences but some private institutions exist as well. They are internally independent, but need licence to practice from the ministry that includes the programmes that can be taught and the student intake. The funding of universities of applied sciences comes from the ministry and municipalities. (Ministry of Education and Culture 2014b.)

THE EUROPEAN QUALIFICATIONS FRAMEWORK

The European Qualifications Framework for lifelong learning (EQF) is a reference tool created to compare the national qualification systems between the European countries. As all member states of the European Union have their own education systems with differing qualifications systems, EQF makes it possible to compare different qualifications and levels of education. This can be used for example to recognise qualifications and thus allow movement of qualified workforce across Europe. (European Commission 2012.)

The EQF is a consequence of years of discussion leading to a recommendation made by the European Parliament and Council in 2008. As it is a recommendation, it does not force member states to action, but it has been agreed by all member states. Each country has its own national coordination point putting the recommendation into action. The aim for the recommendation is to conform national frameworks to the EQF. The EQF is also closely related to Bologna Process and qualifications framework for the European Higher Education Area. (European Commission 2012.)

Concrete tools that have been created to promote unification are European Credit Transfer System (ECTS), transcript of records and diploma supplements that education institutions can use to decipher the studies for others to understand. ECTS is a system to put the length or amount of studies into comparable form. One ECTS credit equals to 25 – 30 hours of work and one academic year to 1,500 – 1,800 hours of work. The Lifelong Learning Programme also facilitates exchange programmes, study visits and network activities for all levels of education, such as Erasmus Programme for higher education. (European Commission 2014.)

The Finnish National Board of Education is responsible for implementing European Qualifications Framework into education system in Finland. It has produced a National Qualifications Framework in 2009 and it has been fully operational from the beginning of 2013. (Opetushallitus 2014.) The European Qualifications Framework has been widely accepted and implemented in Finland and using the tools such as ECTS credits and diploma supplements is seen as a standard.

2.2.2 Education of paramedic practice in Finland

Paramedic practice or emergency care is taught on two levels of education. Vocational upper secondary education in emergency care leads to vocational qualification in social and health care. Health care professionals on this level are called practical nurses. Educational institutes on this level do not use standard ECTS credits, but the programme is equivalent to 180 ECTS credits meaning three years of full-time education. Of the total programme 120 credits are general studies and general nursing studies and 60 ECTS credits specialising in emergency care. (Finnish National Board of Education 2011, 2-4.)

The universities of applied sciences provide higher education of paramedic practice in Finland. There are currently eight universities of applied sciences in Finland providing degree programmes in paramedic practice, including one providing education in Swedish. In addition to the degree programmes, paramedic practice is also taught in some of these institutions as adult education and as a specialisation course for those with a nursing degree.

The degree programme in paramedic practice does not have an official English translation and is called a Degree Programme in Emergency Care, Emergency Nursing, Emergency Care Nursing, Emergency Care and Nursing or Degree Programme of Paramedics depending on the institution.

Outlines of paramedic education are set by the Ministry of Education and Culture in a guideline document for health care education. The document sets key outcomes and general structure of the education. It also sets a requirement for the assessment of clinical skills. (Opetusministeriö 2006.)

Annual intake of students varies because all of the universities do not start their programmes every year. In the last few years a total of around 150 students have started their studies annually in the degree programmes throughout Finland. In the fall 2013, throughout Finland, around 2,800 people applied to the degree programmes in paramedic practice, 1,400 of which chose paramedic practice as their first option. Of these applicants 160 were admitted. (Finnish National Board of Education 2013.)

Paramedic is not a registered profession in Finland. The education is constructed so that the students are eligible to apply registration as a nurse after completing the studies. This gives an opportunity to work inside hospital as well as outside. (Savonia 2013a). No record is kept about where paramedics are employed but it has been studied that in 2008 more than one third of people that had higher education of paramedic practice worked somewhere else than in an ambulance (Antikainen & Hernesmaa 2009, 37.)

Two student paramedics have conducted a survey to assess the state of paramedic education in Finland against the outcomes set by the Ministry of Education and Culture. Although the study group was relatively small and paramedic education was considered good in whole some issues were raised concerning the programme. Students felt that the integrated nursing studies didn't support paramedic studies almost at all. Most students wanted longer placements in pre-hospital emergency care, operating theatre and A&E. Placements were considered too long in mental health and in medical and surgical wards. Education in emergency driving was also considered poor. (Hämäläinen & Lehtimäki 2012.)

2.2.3 Paramedic practice in Savonia University of Applied Sciences

With six fields of study, Savonia University of Applied Sciences is one of the biggest and most versatile Universities of Applied Sciences in Finland (Savonia 2013b). It was founded in 1992 and

awarded permanent status of institution of higher education in 1998. It has operations in three different locations around Kuopio area: Kuopio, Varkaus and Iisalmi. It is currently running 32 Bachelor's degree programmes and nine Master's degree programmes with total of 6500 students and 560 members of staff. (Savonia 2013b.)

The Faculty of Social Services, Health Care and Rural Industries has approximately 1800 students, 140 staff, annual budget of 12,5 million euro and operates in two locations in Kuopio and Iisalmi. School of Health Care in Kuopio offers seven Bachelor's degree programmes and two master's degree programmes in the area of health care. (Savonia 2013b.)

ENTRY REQUIREMENTS AND STUDENT SELECTION

General entry requirements are the same for all tertiary education. The applicant has to have completed a general upper secondary education with the matriculation examination, a vocational upper secondary education or a foreign education of the same level.

The grades in these studies are exchanged into application points according to an exchange table. The applicant also gets extra points for the first course choice in the application. The applicants are put into the order of application points and a certain amount is selected to the entrance examination. (Savonia 2014a, 39 – 40.)

The entrance examination takes place during one day. It consists of a written examination, group exercise, psychological evaluation and a physical test. The purpose of the examination is to evaluate the applicant's social and learning skills and motivation. (Savonia 2014a, 40 – 41.)

The student selection is made solely on the basis of application points. The total maximum of application points is 100. The applicant can get a maximum of 30 points from the previous education, five points from the first choice in the application and maximum of 65 points from the entrance examination. (Savonia 2014a, 39.)

COMPETENCES

The curriculum lists a number of competences that should be achieved during the programme. These are divided into three categories: generic competences, nursing competences and paramedic competences. All of them base on European Qualifications Framework level 6 requirements. Nursing competence is formed of health promotion competence, decision-making competence, clinical competence, inter-professional cooperation competence and counselling and mentoring competence. A summary of paramedic's professional competences can be seen on a table below.

TABLE 8: Paramedic's professional competences.

Professional competences for Paramedic	Description of competence (A student...)
Nursing competence	- possesses competence required in nursing programme that fulfils the requirements of European Parliament directive for nursing degrees
Pre-hospital emergency care competence	- possesses independent and verified advanced life support competence needed in pre-hospital emergency care, including patient assessment, planning of care, execution of care and monitoring of the effect of care
Competence in using nursing technology required in emergency care	- is able to safely use equipment and technology needed in pre-hospital emergency care and interpret information provided by this technology independently
Pharmacotherapy competence	- is able to administer medication independently outside of hospital
Competence linked to emergency care service system and cooperation between the authorities	- knows the structure and operation of emergency medical services, procedures of related authorities and person's own role and function related to other authorities - is able to use communications and information technology that is used outside of hospital
Leadership competence in emergency care	- knows how to take responsibility of executing pre-hospital emergency care - knows how to coordinate and guide paramedic units working subordinate to him/her

STRUCTURE OF STUDIES AND DEVELOPMENT OF EXPERTISE

Paramedic studies are divided into basic studies, professional studies, practical placements, thesis and elective studies as shown in a following table. Nursing studies required by the directive 2005/36/EY from the European Parliament and Committee are implemented in the studies. As these studies are worth 210 ECTS credits they are predominant feature within the studies.

The programme for paramedic practice is divided into four themes according to the levels of professionalism, one for each year of study. The first year is named as *familiarising with the health care and pre-hospital emergency care*, the second *training health care and pre-hospital emergency care*, the third one *applying pre-hospital and emergency care* and the last *developing pre-hospital emergency care*. (Savonia 2013a.)

All courses have a connection to a certain competence and they are timed to help the development of professionalism. Both nursing and paramedic studies start from the beginning and go alongside

the whole time supporting each other. The aim of the programme is to support the student to become an expert of paramedic practice with strong professional ability and a professional who is able to respond to challenges of changing and internationalising work life. (Savonia 2013a.)

Principles of emergency driving are embedded within the paramedic competences. The desired outcome is described so that *the student knows the legislation associated with the emergency driving, knows the principles of safe driving and knows how to use safety equipment in an ambulance.* Emergency driving cannot however be found in the outcomes of separate modules. (Savonia 2013a.)

DELIVERY OF CURRICULUM

Education in Savonia University of Applied Sciences is guided by Open Innovation Space model. It sees student as an actor who works in different spaces, teams, communities and electronic learning environments. Students, teachers, research and development personnel and work life representatives from different fields work together to solve different tasks arising from practice. This combines theory into practice in a new way. Programmes in Savonia University of Applied Sciences are based on the requirements of work life. This is acknowledged by building networks between teachers and work life representatives. (Savonia 2013a.)

The curriculum of degree programme in emergency care defines the learning outcomes, outline syllabus, credit value, principles of delivery, required achievements and assessment or grading details for all the courses in the programme. Fundamental pedagogic teaching method in education of paramedic practice is simulation training. It gives the student a possibility to learn skills in close to authentic environment. The structure of the curriculum is designed to be flexible with alternating close and distant learning. Using electronic learning environments, social media and accreditation of prior learning bring flexibility into the curriculum. (Savonia 2013a.)

ASSESSMENT

Directive of Degrees in Savonia University of Applied Sciences states that the purpose of assessment is to monitor student's accomplishments in relation to the aim of the studies. In the beginning of each study period the students have to be informed about the assessment criteria and how they are applied. The criteria are also defined in the execution plan of each modules or study periods. The student has the right to get the assessment within one month of completing the module, excluding thesis with two-month assessment time and summer vacation time. (Savonia 2012, 12.)

The grading that is used is as follows: excellent (5), very good (4), good (3), satisfactory (2), sufficient (1) and fail (0). Some studies are graded either fail (0) or pass (S). Student who is not satisfied with the assessment can claim for rectification of the assessment from the teacher that was responsible for the assessment. If the student is still dissatisfied with the assessment it is possible to

submit the claim of rectification to an Assessment Board of Savonia University of Applied Sciences. (Savonia 2012, 12 - 13.)

In practice the teacher or teachers responsible for the module assess the performance on their own according to these pre-determined criteria. If no rectification is required the assessment goes only thorough the teacher or teachers responsible for the module in question.

Higher education institutions are responsible for ensuring that the graduating students have the skills and knowledge that is needed in the practice (Opetusministeriö 2006, 76). Students in the degree programme in emergency care are assessed for the skills in basic life support in the end of second year and for the skills in advanced life support in the end of fourth year.

In Savonia the assessment of basic life support skills consists of theoretical test followed by assessment of practical skills. The practical skill section has two phases. Firstly a student demonstrates skills in the key procedures. The second phase has one simulated medical and one trauma case. The students are informed of the criteria to pass the assessment. Savonia teachers make the assessment with the work-life representatives. (Smahl 2014.)

The network of teachers in paramedic practice in Finland coordinates the assessment of advanced life support skills. The theory test is undertaken simultaneously in all of the institutions teaching paramedic practice in Finland. The practical part of the test has again two simulated cases. In addition to this there is an evaluation of professional maturity. In this evaluation the assessor discusses often ethical cases with the student and assesses the student's ethical problem-solving and decision-making. The practical assessment has again pre-set passing criteria and the assessment is joined by the work-life representatives. (Smahl 2014.)

QUALITY AND STUDENT FEEDBACK

Quality management in Savonia University of Applied Sciences is based on the European Foundation for Quality Management (EFQM) model. It consists of four key areas. Excellence factors represent aims or goals which are seen as the most important features where excellence is sought. Client, stakeholder and partner satisfaction is developed by upholding strong relationships and feedback loops with all of the involved parties. Knowledge of the competitive field, anticipating future changes and managing changes skilfully are also seen as important areas of quality management. (Savonia 2014b.)

The quality management system in Savonia consists of external audits that are conducted every six years by the Finnish Higher Education Evaluation Council. Following and evaluating the whole quality management system is seen equally important as the quality of the product. Various indicators are set to evaluate the system. (Savonia 2014b.)

In practice student feedback is collected in the end of each module. The feedback is seen as an integral part of the module and the final assessment is usually not given without the feedback from the student. The feedback is given in the Moodle electronic studying environment. The Ministry of Education also collects feedback concerning the whole course regularly. (Smahl 2013.)

Savonia University of Applied Sciences has a student union Savotta. Student union is an integral part of the university and has an official role in upholding student rights in the university. For this purpose it names student representatives into official bodies in the university administration. In addition to the official representation the student union offers a wide variety of recreational activities for its members. (Savotta 2014.)

3 EMERGENCY MEDICAL SERVICES AND PARAMEDIC EDUCATION IN ENGLAND

3.1 Emergency medical services in England

3.1.1 History and development

The development of emergency medical services in England has been largely due to war and infectious diseases. In the 18th and 19th centuries it was infectious diseases like cholera that forced hospitals to provide transportation for the ill. During the 19th century institutions like St. John Ambulance and Red Cross were created and took responsibility for transport of patients alongside local authorities. At the end of the century larger towns and cities had some sort of patient transport available usually in form of horse-drawn ambulance carts. (Gregory & Ward 2010, 4 – 5.)

Early 20th century saw motorised ambulances replacing horse-drawn carts. During and between the two World Wars Red Cross and other voluntary services were providing the ambulance service throughout the country. In larger cities the local councils also took responsibility in organising the service. At that time the highest qualification to ambulance work was a first aid certificate given by the voluntary aid societies like Red Cross. In the years 1936 and 1937 the "999" system was created to handle increasing volume of calls for emergency assistance. (Gregory & Ward 2010, 5.)

After the World War II in 1946, all local health authorities were required to provide ambulance services by decree of the National Health Service Act. Some of the local boroughs and county councils provided the service on their own while some relied solely on voluntary services from St. John or Red Cross. As local authorities developed their services, need for voluntary service decreased. In the 1950s and 1960s technology went ahead with new ambulance design and introducing two-way radio into ambulances, which was a huge improvement in communications. The out of hospital care was also developed during those decades. All the development led to the Ministry of Health publishing a report giving recommendations on new 6 week basic ambulance aid course and minimum equipment to be carried in an ambulance. By the end of 1960s the new basic ambulance aid course was taught in many newly set up regional training centres. (Gregory & Ward 2010, 5 – 6.)

In 1974 there was a major reorganisation of health services in which the ambulance services became the responsibility of health authorities. As equipment and skills developed and the benefits of early care were starting to show, some groups were pushing for extended training including coronary care, intravenous fluid replacement and advanced airway management. This training faced resistance from Department of Health and Social Security and didn't receive official recognition at that time. Later in the 1980s after evidence of economical and clinical benefits of extended training the National Health Service Training Authority created a national scheme from the existing local schemes. By the early 1990s regional ambulance training centres were providing a standard paramedic course approved by the Institute of Health and Care Development. (Gregory & Ward 2010, 6.)

Political change turned health services into National Health Services Trusts managed and operated with business principles, and by the mid-1990s all ambulance services were operating as NHS Trusts. Around the same time the higher education in paramedic practice began in some universities. The status of higher education also led to the need of professional regulation. In the year 2000 the title of paramedic was registered as a protected profession by the Council for Professions Supplementary to Medicine. The council soon changed its name to Health Professions Council and later to Health & Care Professions Council (HCPC). The registration meant that paramedic had to have an approved training course and meet the educational and practice competence standards. (Gregory & Ward 2010, 6.)

3.1.2 Service providers

NATIONAL HEALTH SERVICES AMBULANCE TRUSTS

National Health Service, or NHS for short, is the main health care provider in the UK. It is publicly funded and provides health care services, including ambulance service, to the whole public free of charge. Some charges like optical and dental services and prescriptions do apply. With more than 1.7 million employees, such as almost 40,000 general practitioners and 370,000 registered nurses, it is one of the biggest employers in the world. (National Health Service 2013.)

The NHS divides into different trusts that provide the actual health and care services and into organisations overseeing and organising the work on local and national level. The NHS works under the supervision of the Department of Health. (National Health Service 2013a.)

There are currently ten ambulance service trusts under the NHS, divided according to geographical regions of the UK. Ambulance Service Trusts provide the public with both emergency and non-emergency services. Answering to emergency calls and unit dispatch is also a responsibility of an ambulance service. (National Health Service 2013b.)

During one year, in 2012 – 2013, there were almost 9.1 million emergency calls made to ambulance trusts, of which seven million led to emergency response on scene. This resulted in over five million emergency patient journeys. (Health and Social Care Information Centre 2013, 10 & 17.)

Ambulance Quality Indicators were introduced in 2011. Before this the only thing that was measured were the response times. In addition to the previous response times the new indicators include for example outcomes from cardiac arrest, myocardial infarction and stroke and service experiences of the service users. The data is gathered in a national database and it is analysed and published regularly. (National Health Service 2014.)

NORTH WEST AMBULANCE SERVICE

The area of England's Northwest is 5,400 square miles (ca. 14,000 km²) and more than seven million people inhabit it. North West Ambulance Service (NWAS) has over 1,000 emergency and non-emergency vehicles in operation with a total of approximately 4,900 employees. It attends more than 952,000 emergency incidents in consequence to over 1.1 million emergency calls a year, 34 % of which was categorised as life threatening. (North West Ambulance Service 2014a.)

North West Ambulance Services has three Emergency Operations Centres in its area of operation. They are staffed with emergency medical dispatchers who answer the calls, prioritise calls according to pre-set categories and dispatch appropriate units if needed. (North West Ambulance Service 2014b.)

OTHER SERVICE PROVIDERS

In addition to NHS ambulance trusts a various number of other service providers also work in the field of emergency care. Biggest nation-wide providers are Red Cross and Saint John Ambulance. Fair amount of smaller local ambulance services exist, British Ambulance Association representing 58 different companies (British Ambulance Association 2014). It is mandatory for all health care service providers to register with the Care Quality Commission to be permitted to practice (Care Quality Commission 2014).

Helicopter emergency medical services in England are charity based. There are many different models of funding and operational services but all are based of charity funding. The NHS ambulance trusts usually participate with compensating the costs of paramedics or technicians. In 2008 there were 17 charities running air ambulance operations with total of 24 aircrafts. In one year's time from 2006 – 2007 they had almost 19,000 missions spending £19.4 million. (Marsh 2008, 7 – 8.) Today the map on the Association of Air Ambulances' web page (2013) shows 21 different charities and 29 helicopters in the area of England.

Around 80 % of the HEMS units were staffed by paramedics only and the rest with paramedic – physician team in 2008 (Marsh 2008, 14). Overview of current web pages of Air Ambulance Charities shows that nine out of 21 has a physician on board.

The HEMS operations in the UK are restricted by regulations of flight operations. Flying during night-time or adverse weather conditions is not permitted. In addition to flying only at daytime unscheduled factors that prevent flying are not uncommon. It is estimated that due to all restrictions HEMS aircraft is available for only half of time. (Leaman & Nutbeam 2011.)

Physicians in the HEMS in England have been accused to prolong the time on scene before transport. A research (Roberts, Blethyn, Foreman & Bleetman 2009) found no evidence to support this accusation in comparison to HEMS unit with a paramedic instead of a physician. The research

actually showed more efficient service in form of more patients treated on scene, less patients transported to hospital and more efficient use of Life Extinct procedures.

3.1.3 Provided service

PERSONNEL IN PRE-HOSPITAL EMERGENCY CARE

Emergency medical technician used to be the standard education for pre-hospital emergency care. With the development of the paramedic profession and recent changes, the National Health Service now refers to this profession as an emergency care assistant. They can work alongside a paramedic in an emergency vehicle or as a first responder. The training of an emergency care assistant is conducted as a six to nine week in-service course. The course consists of first aid, basic moving and handling techniques, patient assessment skills and safe driving. An emergency care assistant can take further training and apply for official paramedic education. (NHS Careers 2014a.)

Paramedics are probably the most coherent group working in pre-hospital emergency care. With Health and Care Professions Council registration and controlled education it is a rather standardised profession. There are currently more than 20,000 registered paramedics (Health and Care Professions Council 2014a).

Some ambulance services employ senior paramedics who are experienced paramedics with additional education and training. They usually attend to the most urgent calls and can advise the paramedics in other units. In addition to their role in pre-hospital emergency care they are also able to assess patients more thoroughly and even give definitive treatments at home. No official requirements for senior paramedics have been set but quite often they include additional training and post-graduate education. (NHS Careers 2014a.)

Physicians do not work regularly and coherently in pre-hospital emergency care throughout England. The Helicopter emergency medical services employ physicians in many places but not everywhere nor at all times. Some physicians also work as voluntary first responders but this is not standard service and is very varied. Even though the Care Quality Commission has set standards for these voluntary services less than half of registered voluntary responders participate in accredited prehospital schemes. (Nutbeam 2011.)

The NHS Agenda for change governs paramedic salary. It means that all personnel are paid according to the level of training and experience. The level of training tells into which Band does the salary fall into. For example a paramedic is Band 5 profession as thus the annual pay is from 21,388 to 27,901 pound. Advanced paramedic is a Band 6 profession and is paid from 25,733 to 34,530 pound per year. (NHS Careers 2014b.)

TIERED RESPONSE

English emergency medical services do not have a tiered response system as such. In theory the service is divided into urgent care and patient transport. All urgent care ambulances are equipped with advanced life support equipment. In practice the division into basic and advanced life support comes from the personnel. In most cases urgent care ambulances are staffed with at least one paramedic, making them advanced life support units. It is also possible for an ambulance to have two emergency medical technicians (emergency care assistants) on board. Some ambulance services also utilise cars with one technician or a paramedic as first response units. No citation was found to support this view.

Community First Responder Schemes are utilised in rural areas where there is no ambulance station nearby. The first responders are volunteers that are trained by the ambulance services. They are on call in turns and respond to the most urgent calls from home or work. The first responders have basic first aid equipment and an automated external defibrillator. (North West Ambulance Service 2014c.)

Some ambulance services employ senior paramedics with leadership and management responsibilities. In most areas there are also helicopter units on call staffed with a paramedic or a physician.

PROCEDURES IN PRE-HOSPITAL EMERGENCY CARE

Joint Royal Colleges Ambulance Liaison Committee is a medical body that upholds and regularly updates UK Ambulance Services Clinical Practice Guidelines. Although they are generally accepted they have to be approved by the local authorities. Changes to these guidelines can also be made locally. (Joint Royal Colleges Ambulance Liaison Committee 2013, Disclaimer.)

The guidelines are meant primarily for paramedics and thus for advanced life support. Other pre-hospital emergency care professionals can use the guidelines in the scope of their training and practice. (Joint Royal Colleges Ambulance Liaison Committee 2013, Disclaimer.)

TABLE 9: Airway management (Joint Royal Colleges Ambulance Liaison Committee 2013, 33 – 50.)

	Basic level	Advanced level
In resuscitation	Supraglottic airway	Supraglottic airway, intubation
Unconscious patient	Bag-valve-mask	Supraglottic airway, intubation
Obstructed airway	-	Cricothyroidotomy

Supraglottic airway devices have become more common and in these guidelines they are shown as primary device for example in resuscitation. Emphasis is also kept on appropriate bag-mask ventilation.

TABLE 10: ECG and arrhythmia management (Joint Royal Colleges Ambulance Liaison Committee 2013, 42 – 49 & 76 – 77.)

	Basic level	Advanced level
12-lead ECG	-	Interpret and send to a physician
VF / VT in resuscitation	AED	Manual defibrillator
Cardioversion	-	-
Transcutaneous pacing	-	+

ECG registration is a basic procedure. On an advanced level personnel should be able to interpret ECG findings and in appropriate situations send the ECG to a physician. In case on bradycardia it is possible on advanced level to use transcutaneous external pacing. It is not allowed to do a synchronised cardioversion in the case of blood circulating tachycardia.

TABLE 11: Other procedures (Joint Royal Colleges Ambulance Liaison Committee 2013, 62; 154 & 235.)

	Basic level	Advanced level
Intraosseous access	-	+
Needle thoracocentesis	-	+
CPAP	-	(+)

The guidelines propose CPAP therapy in case of severe heart failure. The guidelines are however lacking the protocol for CPAP therapy and the wording suggests that it is not very commonly used.

MEDICATION IN PRE-HOSPITAL EMERGENCY CARE

As independent health care professionals paramedics are allowed to administer a pre-determined set of medication on their own initiative in pre-hospital emergency care. (Medicines and Healthcare Products Regulatory Agency 2014.)

The set of medication normally in use in ambulances is often different from the set the paramedics can use on their own. Because of this written prescription guidelines from local authorities are needed for a paramedic to use the medication on their own.

TABLE 12: Medication in pre-hospital emergency care (Joint Royal Colleges Ambulance Liaison Committee 2013, 279 – 365.)

Name (adm. route)	Indications
Adrenaline (i.v. / i.m.)	Resuscitation, anaphylaxis
Amiodarone (i.v.)	Resuscitation
Aspirin (p.o.)	Chest pain
Atropine (i.v.)	Bradycardia
Benzylpenicillin (i.v. / i.m.)	Meningococcal septicaemia
Chlorphenamine (i.v.)	Severe allergic reaction
Clopidogrel (p.o.)	Chest pain with special indications
Dexamethasone (p.o.)	Croup
Diazepam (i.v. / p.r.)	Convulsions
Entonox (inh.)	Pain relief
Furosemide (i.v.)	Pulmonary oedema
Glucagon (i.m.)	Hypoglycaemia
Glucose (i.v. / p.o.)	Hypoglycaemia
Glyceryl trinitrate (oral spray)	Chest pain, pulmonary oedema
Heparin (i.v.)	AMI with special indications
Hydrocortisone (i.v. / i.m.)	Severe asthma, anaphylaxis
Ibuprofen (p.o.)	Pain relief, fever
Ipratropium bromide	Asthma, COPD
Metoclopramide (i.v.)	Nausea and vomiting
Misoprostol (p.o.)	Postpartum haemorrhage
Morphin sulphate (i.v. / i.m. / s.c. / p.o.)	Pain relief
Naloxone (i.v. / i.m.)	Opiate overdose
Ondansetron (i.v.)	Nausea and vomiting
Oxygen (inh.)	Breathing difficulty, chest pain, asthma, resuscitation
Paracetamol (i.v. / p.o.)	Pain relief, fever
Retepase (i.v.)	AMI with special indications
Salbutamol (inh.)	Asthma, COPD
Syntometrine (i.m.)	Postpartum haemorrhage
Tenecteplase (i.v.)	AMI with special indications
Tetracaine 4 % gel	Local anaesthesia before cannulation
Tranexamic acid	Critical haemorrhage

The set of medication covers a wide variety of mostly medical emergencies.

3.1.4 Emergency calls and emergency response centres

Emergency telephone number in England is 999. The European emergency number 112 also connects to the same service via a rerouting service. The call is first answered by a network operator who asks whether the emergency involves the police, ambulance or fire service. The call is then connected to the required service's own call centre. (North West Ambulance Service 2014b.)

The emergency medical services in England use the Advanced Medical Priority Dispatch System (AMPDS) to categorise the calls. It has three categories: category A (red) is life threatening, category B (amber) is possibly life-threatening and category C (green) is non-life threatening. It also gives a reference number to the main condition or complaint of the patient.

After the introduction of Ambulance Quality Indicators the responses were changed. The B (amber) response from the AMPDS was recoded as red 2 thus responses having practically only two responses: A (red 1 and red 2) and C (green). Red response means immediately life threatening and green non-emergency.

Protocols for different services' call handling differ but for example in the North West Ambulance Service an emergency medical dispatcher answers the call, finds out the location of the caller and then uses computerised triage system to categorise the call. A separate dispatcher then finds appropriate unit for the call and dispatches it. There is a separate number for non-emergency calls. (North West Ambulance Service 2014b.)

There is no unified system in England to make records of emergency calls that are made. Two telecom companies (British Telecom and Cable & Wireless) forward 999 calls to emergency services. In 2011 BT handled 31 million and Cable & Wireless six million calls. Only half of calls made in BT network were forwarded and the other half called accidentally or being prank calls. (Moore 2012.)

The communications between dispatch and ambulances and between the authorities is carried out in a secure independent network service kept up by Airwave Solutions Limited. It allows the authorities to communicate in the same network for example in joint operations. (Airwave 2013.) As all emergency services have their own call centres in the need of other authorities the request is made to the own call centre which then relays information to the other authority's call centre.

3.1.5 Regulation

There is no specific legislation regulating the emergency medical services in England. The National Health Service is highly independent public organisation that has many self-regulatory bodies. It is state funded and thus also supervised in a sense by the Department of Health. Regulatory bodies focusing on the emergency medical services are presented below.

COLLEGE OF PARAMEDICS

The College of Paramedics is a professional body that was founded in 2001, as the British Paramedic Association. Some of the main objectives of the College are to represent paramedics and their interests in official bodies, to promote and raise general awareness of the practice, to develop and promote good clinical practice within the profession and within professional education and to promote and report research of paramedic practice. (College of Paramedics 2014a.)

JOINT ROYAL COLLEGES AMBULANCE LIAISON COMMITTEE

Joint Royal Colleges Ambulance Liaison Committee focuses on clinical issues of the profession from a medical point of view. They provide the service with UK Ambulance Service Clinical Practice Guidelines, which are updated regularly. It meets three times a year and works in close co-operation with other professional groups. (Joint Royal Colleges Ambulance Liaison Committee 2009.)

HEALTH AND CARE PROFESSIONS COUNCIL

Health and Care Professions Council (HCPC) oversees the education and registration of health and care professions, including paramedics. The objective of regulation is to protect the public by setting standards for professionals' training, skills, behaviour and health. Paramedics have to register with the HCPC to be able to practice their profession. (Health and Care Professions Council 2014b.)

To register and stay registered the professional has to meet the standards set by the HCPC. These standards include standards of character, health, conduct, performance, ethics, proficiency and continuing personal development with pre-set criteria to pass. (Health and Care Professions Council 2014c.) Health and care professionals from other countries also have to register with the HCPC in order to practice profession in the United Kingdom (Health and Care Professions Council 2014d).

The Council sets standards of education and training (SETs). Education providers have to meet the SETs to be approved to provide education for these professions. The approval process consists of approval visit and annual monitoring. (Health and Care Professions Council 2014e.)

CARE QUALITY COMMISSION

According to its name, the Care Quality Commission oversees the quality of care of all service providers in England. This includes Ambulance Service NHS Trusts as well as all private service providers. All service providers have to register with the Commission in order to operate. After the registration process regular inspections will be made to see whether the quality of care meets the standards. The public can review the reports of these inspections and also input to safety by submitting their experiences or concerns to the Commission. (Care Quality Commission 2014.)

3.2 Education of paramedic practice in England

3.2.1 Education system in England

Education is compulsory for children from the age of five until the age of 18. Education is divided into three stages. Seven-year primary school usually starts at the age of four and is followed by five years of secondary school. At the end of secondary school students take General Certificate of Secondary Education Examinations (GCSEs). After GCSEs they may take two more years in sixth form

schools or colleges usually leading to A Level qualifications or enrol in general further education college for other qualifications. (Royal School 2014.)

A variety of different types of institutions provide higher education in England. Most of them are universities but as a collective they are called higher education institutions. They are legally independent entities with governing bodies that are responsible for their actions. Most institutions are charities, which affects their legal status as well. (Higher Education Funding Council for England 2012.)

Application to higher education in the United Kingdom is done through Universities and Colleges Admissions Service's (UCAS) online application system. Both applicants and universities fund the service. Universities and Colleges Admissions Service provides a tariff system, which converts all UK qualifications into points that can be used to compare applicants in the application process. Eligibility to apply differs between courses and universities, but usually a certain amount of GCSEs and A Level qualifications are set as minimum requirements. (Universities and Colleges Admission Service 2014.)

First degree usually taken is a bachelor's degree that takes three years of full-time education to complete. Other qualifications that can be acquired as a first qualification are foundation degree, higher national diploma, higher national certificate and diploma in higher education. They are usually vocationally orientated and take from one to two years to complete. These all are referred to as undergraduate courses. (Higher Education Funding Council for England 2012.)

Postgraduate courses include master's degree, doctorate and postgraduate diplomas and certificates like postgraduate certificate in education. Diplomas, certificates and master's degrees usually take one year of full time education to complete. Research programmes can last from three to four years of full-time study. (Higher Education Funding Council for England 2012.)

Funding of higher education in England is multi-sourced. Largest single source is the Higher Education Funding Council for England, which allocates funds according to its principles of equality and transparency (Higher Education Funding Council for England 2014). Students have to pay tuition fees that have a maximum amount of £9,000 a year. This is usually covered with a loan from Student Loans Company, a government-owned non-profit organisation. Repayment of a student loan starts after the studies are complete and the former student is employed. (Gov.uk 2014.)

In England the responsibility of implementing the European Qualifications Framework has been given to the Office of Qualifications and Examinations Regulation. It has drawn up a National Qualifications Framework with relations of different qualifications to the EQF. It uses its own credit system with one credit representing 10 hours of learning. (Office of Qualifications and Examinations Regulation 2013.) The other EQF tools such as diploma supplements are not used.

3.2.2 Education of paramedic practice in England

Universities and Colleges Admission Services search finds 25 paramedic courses starting in England in 2014. Ten of these courses award a foundation degree, four a diploma of higher education and eleven a bachelor's degree. In some universities the course is named paramedic practise and in some paramedic science. Foundation degree and diploma of higher education take two years and bachelor's degree of full time education to complete.

All programmes leading to qualifications in paramedic practice should be in compliance with the College of Paramedics curriculum guidance framework. Additionally those programmes aspiring for paramedic registration have to be approved by the Health and Care Professions Council. (College of Paramedics 2014c, 6.) Among other more specific things the curriculum framework sets minimum hours of clinical practice and complete programme. Undergraduate programmes are required to have a minimum of 750 hours of clinical practice per year. (College of Paramedics 2014c, 36.)

Universities and Colleges Admission Services postgraduate application service finds 23 paramedic related courses. Only two of these are degree courses aimed specifically for paramedics. Usually paramedics with foundation degree or diploma of higher education aspiring for a bachelor's degree or those with bachelor's degree apply for postgraduate courses meant for all health and care professionals.

3.2.3 Paramedic practice in Liverpool John Moores University

Liverpool John Moores University is one of three Universities in Liverpool. It is so called *new generation university* formerly known as Liverpool Polytechnic and becoming Liverpool John Moores University in 1992. (Liverpool John Moores University 2014.)

The undergraduate programme for paramedic practice awards with a diploma of higher education. The programme lasts for two years. After the programme the student is eligible to apply for registration as a paramedic from Health and Care Professions Council. The programme has been developed in close co-operation with North West Ambulance Service. Tuition fees are covered with a NHS bursary scheme. The student intake is dictated by the ambulance service according to estimated and calculated need. Although employment is not guaranteed by the ambulance service, all students have been employed this far. (Liverpool John Moores University 2013a.)

After the diploma it is possible to continue studies with a bachelor's degree programme in Health and Social Care Development. The course takes one year to complete. (Liverpool John Moores University 2013a.)

Currently there is no master's programme dedicated to paramedic practice, but paramedics with bachelor's degree can advance into other health related master's programmes. Dedicated master's

programme for paramedics is under preparation. Liverpool John Moores University also offers postgraduate research opportunities for those aspiring the title of doctor of philosophy. The NHS or other organisations can fund postgraduate programmes.

ENTRY REQUIREMENTS AND STUDENT SELECTION

General entry requirements for programmes in the LJMU are five GCSEs at grade C or above and they have to include English and Mathematics. In addition to this there is a requirement of minimum UCAS tariff of 280 points from A level or equivalent qualifications. Applicants also have to produce health clearance, criminal record check and a reference letter in the application. A personal statement with emphasis on understanding and commitment to the profession is also required. Applicants are required to have a full driving licence and C1 licence is required when employed. Application is made through UCAS web application service. (Liverpool John Moores University 2013a.)

Applications are short-listed on the basis of meeting the basic and exclusive entry requirements. After that the personal statements and references of the applicants are evaluated in the light of set criteria and applicants are selected to interview. In addition to the university staff the interviewing and selection process involves service providers and practice staff. The interview and selection process is standardised to ensure consistency and equality. (Liverpool John Moores University 2013a.)

For the emergency medical technicians working in the North West Ambulance Service it is also possible to apply to the programme for the second year studies only. This option is an arrangement between the North West Ambulance Service and Liverpool John Moores University and it is approved by the College of Paramedics and Health and Care Professions Council. The course awards a diploma of higher education in paramedic practice.

AIM OF THE PROGRAMME

The aim of the programme is to *produce paramedics who are fit for purpose, fit for practice, fit for employment*. Two major contributors to the curriculum are College of Paramedics' curriculum framework and Health and Care Professions Council's standards for paramedics. (Liverpool John Moores University 2012, 2.) These two instances look at the curriculum from different perspectives. Health and Care Professions Council approves the curriculum in the light of professional registration and fitness for practice. The College of Paramedics is more interested in the clinical contents.

The programme aims to train holistic professionals to the field of paramedic practice. In addition to theoretical and clinical skills it prepares the graduates for the dynamic health care of today and the future. It also gives skills for personal and professional development and research activities. (Liverpool John Moores University 2012, 3.)

STRUCTURE OF STUDIES

Programme of paramedic practice in Liverpool John Moores University is built from ten modules, five each year. Each module is worth 24 credits and consists of 240 hours of work. The Health and Care Professions Council has set a requirement of 750 hours of teaching at the university.

The College of Paramedics requires 750 hours of clinical practice each year of the programme. These hours are not included in the modules. Completing Developing Paramedic Practice module in the first year and Advancing Paramedic Practice module in the second year requires completing all of the practical placements. The accumulation of placement hours is followed in the Practice Assessment Documents.

Each module has a Module Proforma. It states the aims, learning outcomes, outline syllabus and learning activities of the module. It also says how the module is graded and gives details about the assessment. Finally it gives references to the material that is used in the module.

Programme Plan explains how the studies are carried out throughout the two years. Generally all modules go on through the whole year with intermittent clinical practice. Each three to four weeks of theoretical studies at the university is followed by three to four weeks of clinical practice.

Clinical practice is done mainly in pre-hospital emergency care. First placement in an ambulance is spent in non-emergency patient transport and as an observer in an emergency ambulance. Fifteen weeks of clinical practice is done in an ambulance each year. In the first year one week short placements called *spokes* are conducted in an accident and emergency department, acute care, paediatrics, midwifery, nursing home and primary care trusts. In the second year one week *spokes* are in the A&E, mental health, walk in centre and coronary care unit and a two week placement in an operating theatre.

Driving an emergency vehicle is addressed briefly in the module Developing Paramedic Practice. There are no official outcomes for this topic. The ambulance services provide their employees with a mandatory emergency driving course, which has to be passed in order to be employed. The course is usually a three to four week in-house course. (College of Paramedics 2014b.) The course is heavily practice based and in addition to vehicle handling a major part of the course is assessing and teaching the right attitude towards driving an emergency vehicle.

DELIVERY OF CURRICULUM

The College of Paramedics (2014c, 24 – 25) emphasises the use of varied teaching methods to deliver the curriculum. Methods should be student-centred and include reflection, problem-solving, learning with students from other disciplines and training other high-level cognitive skills.

In the Liverpool John Moores University problem based learning is implemented into two modules, one each year. Other delivery methods include traditional classroom teaching, group discussions, demonstrations, role-play, skill-stations and simulation training.

Simulation training is used to train students in clinical skills and also to assess these skills. Simulation is used in both low and high fidelity setting. A new simulation environment with indoor ambulance has recently been built in the university. Currently there is no guideline in the use of simulation training and the staff does not have formal training in the use of simulation. (Ambrose 2013.)

ASSESSMENT AND DEVELOPMENT OF PROFESSIONALISM

Liverpool John Moores University (2013b) has a specified Assessment Strategy for the Diploma in Higher Education, Paramedic Practice. It is based on requirements of knowledge, skill and professional that are described by the College of Paramedics, the Health and Care Professions Council and the Quality Assurance Agency. It is emphasised in the strategy that in addition to the regulatory standards, the actual work of a paramedic with challenging and changing situations sets its own requirements for the education and assessment.

A wide variety of assessment methods is used to make a comprehensive assessment. Some modules are more theoretical and some more practical, and both need their own method of assessment. Assessment is strongly linked to learning outcomes of modules. List of methods used in assessment include written essays, case studies and reports, practical demonstrations, seminar and poster presentations, practice-based competency records and portfolios. In addition to knowledge and skill, professionalism, like professional conduct, communication and personal development, is also assessed. (Liverpool John Moores University 2013b.)

Assessment of studies follows Liverpool John Moores University's Methods of Practice. Marking of an individual module starts with First Marker, who follows pre-set requirements for assessment. Another person, Moderator, then goes over markings and discusses them with the First Marker if needed. Moderation Team then inspects the markings. The markings of the whole module are then submitted to an External Examiner from another institution who again goes over the marking process. If everything has gone according to the Assessment Strategy, the markings are then presented to the Assessment Board for final confirmation. (Liverpool John Moores University 2013b.)

The assessment of theoretical modules will take place in the end of each module. The assessment is carried out so that resubmission after a failed attempt is possible within the timeline of module assessment. Practical assessment is carried out on weekly basis throughout the modules. Assessment is strongly linked with feedback and the strategy emphasises constructive feedback as a fundamental part of the assessment process. The feedback and assessment is linked together in a structure called Personal Development Planning. (Liverpool John Moores University 2013b.)

As fifty percent of studies is done in practice, integration of theory and practice is seen as a crucial point of personal development. Practice Assessment Documents and Skills Log is regularly supervised and personal development meetings are held to support students through the studies. Certain modules on each year contain elements of problem based learning that teach students to combine theoretical and practical studies from all modules. (Liverpool John Moores University 2012, 22 – 23.)

QUALITY AND STUDENT FEEDBACK

The quality of education is monitored and regulated in many ways. The Health and Care Professions Council has the Standards of Education and Training and Standards of Proficiency which have to be met in the education. The institution has to revalidate the programme every five years. The programme also has to meet the requirements of College of Paramedics Curriculum Guidance and Competence framework which is revalidated at the same time with HCPC revalidation. The Quality Assurance Agency conducts an institutional review every six years. (Liverpool John Moores University 2012, 13.)

The university has its own procedures for quality assurance and programme delivery called Liverpool John Moores University Academic Framework. The framework itself is reviewed every five years and minor changes can be made more often. Each programme has to assess itself annually. This annual monitoring process gathers data like feedback from programme team, students and practice staff, external examiner reports and student completion data. This data is discussed in the Board of Study taking place twice a year and possible improvements are conceived in an action plan. (Liverpool John Moores University 2012, 14.)

External examiners are used to give an outside view of each programme. The external examiner ensures that the programme delivery and student assessment are carried out according to the standards. This means that the examiner makes regular visits to the university and goes through the assessment data from the university. (Liverpool John Moores University 2012, 15 - 16.)

Student feedback has an important role in developing the programmes. The feedback is gathered in the end of each module and placement. Final year students can participate in a National Student Survey. System of student representatives is embedded in the faculties with the minimum of one representative being chosen from each programme cohort. Student representatives have access to many university bodies. Student Union also represents students and their views in the official bodies. (Liverpool John Moores University 2012, 14 - 15.)

4 RESEARCH ON PARAMEDIC PRACTICE

Research on emergency medical services and paramedic practice is not very organised or even popular in Finland. Issues on emergency medicine are regularly addressed and lead to changes in the practice. This kind of research is most commonly done as a part of doctoral studies. On the other hand in Finland all paramedics have to conduct some kind of research as part of their bachelor's thesis. These are more commonly conducted as practical projects such as training.

Between these two aspects there is a void of paramedic research. In Finland the Ministry of Social Affairs and Health has produced a few reports on emergency medical services in the past two decades. *Ensihoitotyöryhmän muistio* (Sosiaali- ja terveysministeriö 1997), *Ensihoito- ja sairaankuljetuspalveluiden kehittäminen* (Kuisma 2007) and *Sairaankuljetuksen ja ensihoitojärjestelmän kehittäminen* (Jonkka 2007) have been major contributors towards the new Health Care Act in 2010 and today's emergency medical services in Finland.

There is no post-graduate education specifically for paramedics in Finland. The post-graduate education in the universities of applied sciences mainly aims for management and leadership. Paramedic practice is also not a course in scientific universities. This all results in the lack of interest in paramedic specific research.

In England the situation is similar. The latest report to make changes into ambulance services is the National Audit Office's report *Transforming NHS ambulance services* in 2011. In addition to reviewing the current state of the ambulance service it made a series of recommendations of which some have already been put to action. Key findings include emphasis on cost-effectiveness, introduction of clinical performance indicators and the need of cooperation and coordination of ambulance services within the UK.

The NHS Office of Strategic Health Authorities undertook an interesting project in 2009. *Emergency services review – A comparative review of international Ambulance Service best practice* was a structured interview sent to a variety of emergency medical services outside of the UK. The questions were mainly about performance or efficiency of the services. Although the project did not result in immediate changes it showed that the most services tackled with similar problems like the increase in demand of services. International research and cooperation was seen important in addressing the problems. (Bradley & Irwing 2009, 1 – 3.)

Jones (2012, 10 – 13) has also noticed the lack of paramedic-specific research in the UK. His view is that the reasons are similar to Finland. The research is done by non-paramedics and not about the paramedic profession. In his research he surveyed the opinions of paramedics in leading positions on the paramedic research priorities in the UK. Among the actual findings he suggests that the paramedics should be more involved in the research in their field.

EMERGENCY MEDICAL SERVICES SYSTEMS IN THE EUROPEAN UNION

The kick-start for this research was the World Health Organization's project comparing the emergency medical services throughout the European Union. The project was conducted in 2008 with representatives from all of the member states.

The aim of the project was firstly to develop a data collection template for the project. Secondly to collect data from all member states and use it to compare emergency medical services systems throughout the European Union. (World Health Organization 2008a, 18.)

The template consists of structured parts on legislation and financing, out-of-hospital emergency medical services, in-hospital emergency medical services, education and the role of EMS in crisis management (World Health Organization 2008a, 19). The results are presented as tables and charts with joined descriptions. Additional data book shows each member state's individual answers to the questionnaire.

The project concludes that the emergency medical services systems vary greatly between the member states. Suggestions were made to develop common performance indicators for benchmarking and cost-effective optimisation between the member states. Also a common curriculum for emergency medicine as a medical speciality was suggested. Variance in other emergency medical services professions and their education was so great that no suggestions were made for their harmonisation. (World Health Organization 2008a, 14.)

The project had some major problems in developing the template and gathering the data. The project was however the first of its kind in the European Union and will without a doubt be continued – hopefully with more tangible results.

PARAMEDIC EVIDENCE BASED EDUCATION PROJECT

Another major contribution to this work has been the Paramedic Evidence Based Education Project, a study commissioned by the Department of Health in England and conducted by professor Mary Lovegrove and June Davis from Allied Health Solutions in 2013.

In their research Lovegrove and Davis describe the field of paramedic practice and paramedic education in England today. More importantly they give specific suggestions on how the paramedic education should be developed in the future. (Lovegrove & Davis 2013, 3.)

Paramedics seem to be very well regarded by the public. It is also evident that paramedics have an important role in health and social care and public safety. Currently the paramedic training varies throughout the country as it is locally determined. Varied education leads to variance in the learning outcomes and finally in the service itself. Funding models are also locally determined and in some

areas the students are able to apply for bursary support whereas in other areas bursaries are not available. (Lovegrove & Davis 2013, 3 – 4.)

One of the two major suggestions is to rise the requirement for Health and Care Professions Council registration for paramedics. The suggested minimum threshold level would be a diploma of higher education. This means that the current foundation degree and apprenticeship programmes would no longer give eligibility to apply for paramedic registration. (Lovegrove & Davis 2013, 4.)

Another suggestion tackles the problems in the funding of paramedic education. The suggestion is to have a nation-wide paramedic education funding model in line with other National Health Service non-medical training funding. In practice the suggestion is to have Higher Education England or Local Education and Training Boards to provide the bursary support. With the bursary support people from different financial backgrounds were able to apply to a paramedic training. (Lovegrove & Davis 2013, 4.)

The research also suggests changes into the current paramedic programmes. The suggestions include decision-making skills, leadership skills and various skills concerning multi and inter-professional work (Lovegrove & Davis 2013, 6).

RESEARCH ON EMERGENCY DRIVING

The issue of emergency driving has been addressed regularly in thesis level research in Finland. The general consensus seems to be that the current training provided by the educational institutions varies considerably and is not sufficient (Ronkainen & Sillanpää 2013, 25 – 29).

The majority of road traffic collisions involving an ambulance in Finland happen in good weather and road conditions in urban area and at low speed. In most incidents the ambulance was considered as guilty party. It is suggested that training in actual driving skills and influencing towards safe driving attitude would reduce road traffic collisions involving ambulances. It would also be beneficial to found a database for recording these incidents. (Kulju & Pappinen 2011, 60 – 61.)

Initiatives have been made to raise the issue in the ministry level. Most recently Suomen Ensihoitoalan liitto (The Finnish Association for Emergency Care) made a statement for the latest Health Care Act and associated decree to include training for emergency driving. (Suomen Ensihoitoalan liitto 2010, 6.)

There is no system in place for registering and reporting road traffic accidents involving emergency vehicles. In England topic has been raised as well but further action is yet to be made. It is however reported that in Great Britain (excluding Northern Ireland) around 300 to 370 accidents involving an ambulance happened in a year between 1999 and 2004. Number of casualties in these accidents was between 500 and 640 a year with from four to eleven fatalities. (Lutman, Montgomery, Ramnarayan & Petros 2008.)

5 RESEARCH PROCESS AND METHODS

RESEARCH OBJECTIVES

The main objective of this research is to compare the curricula of paramedic practice and delivery of these curricula between Savonia University of Applied Sciences and Liverpool John Moores University. A presumption is that some differences rise from differences in education systems and emergency medical services systems. These systems are compared and the key differences are pointed out. Thus the two research objectives are to:

1. Compare the emergency medical services between Finland and England
2. Compare the paramedic practice programmes between Finland and England

RESEARCH METHODOLOGY

Quite often it is not possible to analyse one's own structures or actions without a parallel unit or structure. Nor is it easy to define how much is too much or too little. This is the main reason for comparative research. When things are compared to another similar units it is possible to analyse relations between these factors and even causalities. (Pöntinen 2004, 43.)

The field of comparative research is varied. Comparisons can be quantitative or qualitative. It is mainly focused on international or cross-cultural comparisons but the methods range from macro to micro perspective, from case studies to statistical comparison and from causalities to the analysis of significance. Probably the most important common factor in this field is that the number of compared units is relatively low. (Alapuro & Arminen 2004, 10 – 11.)

A distinction is also made between comparative and cross-cultural research. Comparative research is quite often quantitatively orientated and strives for strict definition of concepts while the cross-cultural research is more focused on comparing a phenomenon in different contexts. Qualitative methods are more usual and the definitions are not as important as in the comparative research. Cross-cultural research can be defined as a systematic comparison that aims to answer questions about incidence, variance and reasons for cultural variation. (Gordon & Lahelma 2004, 99 – 100.)

Comparative cross-cultural research was chosen as a method for this research. The goal would be to gather information to describe main differences between the countries and programmes. Underlying hope was also to give information for benchmarking style improvement of both programmes.

A single descriptive research on the English emergency medical services and the paramedic practice programme was also considered. It would not have provided any useful information for the English partner institution and thus it was not chosen. At this early stage of co-operation between the universities an all-round descriptive snapshot of how things are at the moment was considered more useful. Others could fill the shortcomings of this research later.

RELIABILITY, VALIDITY AND ETHICALITY

A research and its results should be truthful. This subject has two aspects: reliability and validity. Reliability of the research stands for its ability to produce non-random results. This means that if the research was repeated exactly the same way the results would be the same as well. In some fields of research, particularly in quantitative research, there are standardised meters for measuring the reliability of the research. (Hirsjärvi, Remes & Sajavaara 2009, 231.)

Validity of the research means the ability to measure exactly what it was supposed to. This means that the researcher can for example understand questions in a questionnaire differently than those who answer them and of course leads to false assumptions. (Hirsjärvi et al 2009, 231 – 232.)

Qualitative research has some problems implementing reliability and validity into practice. Statistical methods for confirming reliability do not usually apply. Some research can also be so unique that validity cannot be measured. Even with these shortcomings this subject should be assessed in every research. Quite often in qualitative research this can be achieved by carefully explaining the research method and process to the readers. The reader should be aware of how the data has been gathered and why these particular assumptions have been made. (Hirsjärvi et al 2009, 232 – 233.)

Comparative research has its own problems in reliability and validity. One is defining the used concepts. In an cross-cultural comparative research two societies and most often two languages collide. Simple concepts like professions can be understood differently or the professions can actually be different. Countries also quite often gather statistical data differently, which can make comparisons difficult. This leads to problems in building a valid meter and an invalid meter can lead to invalid results. (Pöntinen 2004, 45 – 47 & 51.)

This research tries to be as objective as possible and only official written documents were used as references. Some interviews were made in person and by e-mail to confirm things that were unclear. Thus the reliability of the research is considered good. The research process is explained in the next chapter of this research.

Teachers at both institutions were used coherently to verify findings and comment on the research. This was seen as an important part of the validity of the research. In some cases there was a contradiction between the teacher's opinion and a written reference. These cases were discussed with the teacher before adding them to the work.

The used concepts were carefully considered. The concepts have some variance inside the countries and some further explanations and disclaimers were made where they were needed. Even with these explanations this research has a limited value in generalisation of the results because of this variance of the concepts within the countries.

Validity of this research has two levels. On the level of the curriculums that were compared the validity is good because of the close co-operation with the teachers in both partner institutions. However the emergency medical services had so much variance within and between the countries that validity of the concepts cannot be guaranteed.

This research does not have apparent ethical problems to be considered. However general ethical points in a scientific research have to be considered in every research. Participation into a research has to be voluntary and in most cases anonymous. The results have to be presented with a healthy criticism and without embellishment of the results. (Hirsjärvi et al 2009, 25.)

The teachers in both institutions had a key role in providing some of the compared information. Thus the participation in this research cannot be considered fully voluntary. The idea of the research was however discussed with the teachers before starting and both parties were very interested in participating in the research. Permission was also asked from the contacts to use the interview answers in this research. Contacts in both of the institutions were kept up to date with the research process.

RESEARCH PROCESS

This research started with an idea of international partnership research in the field of paramedic practice. Savonia University of Applied Sciences had just begun an international partnership with Liverpool John Moores University with one aim particularly at student paramedic exchange programme.

Liverpool John Moores University was interested in participating in research. The idea developed quickly into comparative research on both institutions' curricula of paramedic education. An assumption was made at this point that the emergency medical services in England and Finland had differences that were reflected into the curricula. Because of this the decision was made to compare the emergency medical services as well.

A major contributor to this research is the World Health Organization's report on the emergency medical services in the European Union. It gave ideas on what to compare and verified that closer scrutiny into this matter was necessary. The report is introduced more thoroughly in the research chapter of this study.

The report was used to choose the topics that were compared in this research. The topics that were chosen were *professions in the emergency medical services*, *service providers*, *provided service*, *regulation of emergency medical services* and *emergency call handling*. In this research the professions are addressed under the provided service chapter. *History and development* was chosen to complement the bigger picture.

The compared topics for the curricula were chosen directly from the curriculum of pre-hospital emergency care in Savonia University of Applied Sciences. These topics were *entry requirements, competences or outcomes, structure of studies, development of professionalism, delivery of curriculum* and *assessment*. After getting acquainted to the curriculum in Liverpool John Moores University *quality* was added to the compared topics.

The World Health Organization's research of the European emergency medical services systems seems to have fallen into one of the pits of comparative research. The results were so heterogeneous between the countries that they were not always useful. This is why more open qualitative method was chosen to this research. The idea was to compare statistical and otherwise directly comparable data where possible and to add relevant non-comparable data for additional information.

The research process can be described as three phased. The first phase was designing the study and gathering information on the Finnish part of the research. Previous research on paramedic practice was also sought internationally. English references were used wherever possible. English names of Finnish officials were used in the references if the text themselves were in English. Texts that were only in Finnish were referred to with Finnish names as well.

Second phase was getting to know the English emergency medical services and the paramedic programme in Liverpool John Moores University. This was executed on a two-month field trip to Liverpool. Being in Liverpool gave convenient access to the English literature, programme documents and lecturers. Observing paramedic work in an ambulance first hand gave insight into the practice in England and a possibility to interview local professionals.

Search of information in both countries has similar problems – abundance. There was certainly not a lack of information generally on the subject. A lot of the information was found to be internet-based. From these sources only official public instances were chosen. On the other hand scientific research on the subject apart from medical point of view was not common.

Interviewing the teachers in Liverpool John Moores University and professionals in the field was used to improve validity of the research. Informal interviews were used to confirm information and references. Staff at Liverpool John Moores University also gave feedback and suggestions on the research.

The third part of the research was analysing the information and writing the report. It was also necessary to gather some additional information to find missing pieces in the comparison. At this point the staff from Liverpool John Moores University and Savonia University of Applied Sciences were used to confirm some findings again to improve validity. Some information was still gathered during the actual writing process because some things required some deepening and references.

6 ANALYSIS

It is difficult to compare two countries that are physically so different. Finland has the landmass of 338,000 km² (132,000 sq. mi) and population of mere 5.4 million. That adds up to a population density of 15.8 per km² (40.2 per sq. mi). England on the other hand is 130,000 km² (50,300 sq. mi) in size and has a population of 53 million giving a population density of 407 per km² (1,054 per sq. mi).

This difference, without a doubt, grants both systems benefits and difficulties of their own kind. For example one could think that average response times and length of journeys was longer in Finland. Heavier traffic in England could result in more congestion and delayed response in those conditions.

6.1 Emergency medical services

HISTORY AND DEVELOPMENT

The early development of emergency medical services in Finland and England seem to follow very similar pattern phased by the World Wars up until the end of World War II. At this time England seems to have a technological advantage. For example 999 emergency call system began as early as 1936.

The end of World War II seems to be a point where the development of emergency medical services in Finland stopped while in England it went on. In England the responsibility of organising emergency medical services was given to the municipalities immediately after the war whereas in Finland this development took place only in 1972. There must have been development in between but the lack of official organising body and guidance hindered the progress throughout Finland. This could be because Finland – being on the losing side of the war – had to pay reparations to Russia thus hindering the general development of the economy.

Another crucial difference is the decision of service providers. It is not clear how England concluded in the public service provision but the decision was made quite early leading to a fairly coherent system throughout the country.

In Finland the decision about the service providers was made as late as 1972 and led to a multi-sourced services. In the author's opinion this decision led to a system with too many participants that hindered the development of emergency medical services even more. The Health Care Act in 2010 brought some clarity into responsibilities but no major changes to service provision.

The emergency medical technician training began in the late 1960s. It seems to be fairly coherent and widely used training in England. The higher education in paramedic practice began in the mid 1990s. The technician level training began in the early 1970s in Finland but did not seem to be very well accepted. The vocational education for the ambulance began in the mid 90s but it has been

criticised from the beginning. Higher education in paramedic practice was founded in 1998. The education of emergency medical personnel is thus fairly similar with England being a step ahead again.

SERVICE PROVIDERS

TABLE 13: Service providers.

	Finland	England
Service provider	Mixed	Mainly public
HEMS	Public	Trusts

England has a relatively straightforward provision of emergency medical services. Regional ambulance services that are organised under the National Health Service provide virtually all land based emergency medical services. Helicopter emergency medical services are not publicly funded and they are organised as trusts. A small amount of private ambulance companies work throughout the country mainly focusing on patient transport services.

Finland has a wide variety of service providers in the emergency medical services. Hospital districts and fire departments provide public service whereas in many areas private companies provide the service. In the private sector the tendency has been towards larger companies. The new Health Care Act has a potential for longer and more stable contract tendering but its effect is yet to be seen.

PROVIDED SERVICE

Tiered response

Both countries have a tiered response system but they utilise it differently. The Finnish system has certain pre-determined units that are either basic or advanced life support units. In addition to this there are first response units on call and HEMS units with a physician on board. All hospital districts provide field operatives with leadership responsibilities called *kenttäjohtaja*.

In England procedures vary and the level of care depends on the personnel on board. Most often urgent care ambulances are staffed with a paramedic and are thus advanced life support units. First response system utilises laymen with training and contract with the ambulance services. Physicians do not work coherently throughout England in the pre-hospital emergency care. Some of the HEMS units are staffed with a physician and some with a paramedic. Some ambulance services have senior paramedics with leadership responsibilities and quite often additional training and slightly wider selection of medication in use.

It was still left unclear how the level of care is determined in England and if there are requirements for paramedic presence in the calls.

Interesting similarity is the progress towards senior paramedic personnel. The system is quite new in both countries. In Finland there were similar personnel before but the new health care act made it mandatory for all hospital districts to have such personnel in the field. In England it seems that only some of the ambulance services have senior paramedics. It also seems that the need for this level of profession has risen from the field.

Personnel

The personnel working in the emergency medical services vary quite considerably even within the countries. The EMS education in both countries has changed a lot during the last two decades and thus employees with different training work in ambulances.

TABLE 15: Minimum training requirements.

	Finland	England
Basic life support	Vocational qualification	Work-based training
Advanced life support	Bachelor's degree	Foundation degree
Physicians	No specific requirements	No specific requirements

In Finland the new legislation sets the minimum education for basic life support as a vocational secondary education of practical nurse specialised in emergency care. Fire fighters are also allowed to work alongside a health care professional on basic level. Some employees still have older qualifications for emergency care. There are no legal requirements for the work in an ambulance in England. The requirements vary regionally and in most places work-based training like ambulance care assistant or emergency medical technician is needed for basic life support units.

In Finland the requirement for an advanced life support unit is that at least one of the crew has to be a paramedic. In this instance paramedic is a person that has completed a degree programme in pre-hospital emergency care or is a registered nurse that has completed specialisation course in pre-hospital emergency care. Quite often work experience of one year from basic life support is also required.

The requirement for the advanced life support unit in England is the same as in Finland. Paramedic training however varies regionally. Quite often the paramedic has a diploma of higher education with a two-year training. College of Paramedics sees a two-year foundation degree a minimum training requirement for paramedic work.

Senior paramedics in England compare well with the Finnish *kenttäjohtaja*. Both are experienced paramedics with additional training. They both have responsibilities in leadership and management of daily operations. They both respond to most urgent calls and for example to situations with multiple casualties. Specifics vary regionally but they might have extended set of medication and procedures in both countries.

Physicians working in pre-hospital emergency care work almost solely in five HEMS units throughout Finland. Only the city of Helsinki has an its own physician-led ambulance unit. Most physicians are anaesthesiologists or specialising in anaesthesiology. Emergency medicine is not a medical speciality in Finland. In England physicians in the emergency medical services usually work in a HEMS unit or as a first responders. There are no specific training requirements for physicians working in the emergency medical services.

Procedures

TABLE 14: Procedures.

Procedure	Finland	England
Intubation (unresponsive)	ALS	ALS
Intubation (unconscious)	(ALS)	(ALS)
Supraglottic airway	BLS & ALS	BLS & ALS
ECG	Up to 15 lead	12 lead
Cardioversion	Yes	No
Intraosseal access	Yes	Yes
CPAP	Yes	No

Procedures done in the ambulance seem to differ a bit between the countries. According to the literature the airway management is very similar. The role of intubation seems to be changing in both countries with supraglottic airways becoming more dominant.

With the ECG the English literature still mostly refers to 12 leads being used whereas in Finland the tendency is towards 13 or 15 leads. In Finland it is also very common for a basic life support unit to be able to take 12 lead ECG and send it to a physician for interpretation. Advanced life support units in Finland perform synchronised cardioversion whereas in English guidelines it is not recommended.

In both countries intraosseous access has become common but in Finland it is also taught to the BLS staff. In Finland the CPAP therapy is very commonly used (in some places even on BLS level) but in the English guidelines it is not included.

Medication

Although the medication used in the ambulances is quite similar, there are some differences as well. First of all in Finland all prescription medication has to be prescribed by a physician. Paramedics have to have a pre-described set of medications that can be administered if certain pre-set indications are fulfilled. In England paramedics are allowed to give certain prescription medication themselves without a prescription from a physician.

In Finland BLS staff is also allowed to administer a small amount of medications with the written guidelines from a physician. These medications are administered via oral or rectal route with the

exception of glucose and adrenaline, which can be administered intravenously. In England the guidelines are for paramedics and thus for ALS. This probably means that there is no medication in use in BLS but local guidelines may vary.

Pain relief differs between the countries. Morphine seems to be the only intravenous opiate used in England. Non-steroid anti-inflammatory drugs are also commonly used orally. In Finland the NSAIDs are not used outside of hospitals and a variety of opiates are used intravenously. Commonly morphine or oxycodone is used as a longer lasting pain relief and fentanyl or alfentanil if the effect is needed more quickly. Inhaled nitric oxide is not used outside of hospital in Finland.

Intravenous antibiotics are not used in Finland in pre-hospital emergency care. Reason for this is unknown. There has been discussion about pre-hospital treatment of sepsis and other severe infections and this issue could change in the near future.

The use of vasoactive medication also differs a lot. In England no other vasoactive drug than adrenaline is in use. Its use is also limited to resuscitation and treatment of anaphylaxis. In Finland dopamine infusion has been in the set of medication for a long time. In some places there are guidelines for the use of adrenaline infusion. In the last few years there has been discussion about the use of noradrenaline infusion in the prehospital emergency care. Some HEMS units already have noradrenaline in their use.

Other

Target times to reach patients have some similarities between the countries. Both seem to consider eight minutes an optimal time to reach most urgent patients. English target times seem to be set from above without much regard to length of journey or remoteness of the target location. Only distinction is made roughly between urban and rural areas. In Finland each location has to be categorised into one of five risk area levels. Each level has its own target times. This system is new and it is not yet clear how well this system works in practice.

Emergency medical services in both countries use similar communications technology, using independent network and encrypted channels.

Funding model of the emergency medical services in Finland is multi-sourced. The service is mainly publicly funded through a fairly complex compensation system. The service user has to pay a fee of 14.25 € for each call that leads to a transport to hospital. In England the service is publicly funded and completely free of charge to the service users. It would be interesting to see research on how free service compares to one with service fee in an inappropriate use of the service.

EMERGENCY RESPONSE CENTRES

TABLE 16: Emergency response centres.

	Finland	England
One emergency number	Yes	Yes
Unified emergency call centres	Yes	No
Standardised training for call operators	Yes	No
Computerised call handling	Yes	Yes
Emergency instructions given over the phone	Yes	Yes

In England the emergency telephone number 999 is practically still the only one in use. The European Union emergency number 112 does connect to emergency services but has not gained wide publicity. It is also possible to contact emergency services with an text message although this requires pre-registration. The operators' roles differ from one place to another, but for example North West Ambulance Service call taker answers the call and uses computerised system to prioritise the call. A dispatcher then finds a suitable unit for the call.

The European emergency telephone number 112 is the only one in use in Finland. The call connects directly to Emergency Response Centre that handles all emergency calls and dispatch in Finland. This brings many advantages in call handling and co-operation especially in incidents involving multiple authorities. This also sets more requirements for the operators. This has been solved with an official training for Emergency Response Centre Operators. One call from answering to dispatch is usually handled by one operator while another operator could be responsible for monitoring units with assignments.

In both countries the emergency call operators are able to advice caller for example in cardiopulmonary resuscitation. In England the practises vary, but for example in the North West Ambulance Service there is a specialist paramedic who can advise callers in using health services in non-emergency situations. In Finland this kind of services is now developing and they are usually on the responsibility of accident and emergency departments.

In both countries using standardised computer program is used in the call categorisation. Both services also use the same communications technology with independent, secure network.

Mainly because of unified emergency call handling and the standardised training for the emergency response centre operators The Finnish Emergency Response Centre appears more effective. The system proves most effective in situations with multiple authorities when no additional inter-response centre communications is needed. The system has however been criticised for the lack of knowledge for local circumstances.

English Emergency Operations Centres provide better service for instructing callers in non-emergency situations with paramedics dedicated to this task. While in Finland this kind of service has

been started and is developing in the A&E departments, it would be beneficial to the callers to install procedures when to redirect calls to these call centres.

REGULATION

TABLE 17: Regulation of a paramedic profession.

	Finland	England
Legislation on emergency medical services	Yes	No
Regulated registration as a health care professional	Yes	Yes
Independent registration as a paramedic	No	Yes
Regulated continuous education	(Yes)	Yes
Required revalidation	No	Yes

In Finland the principles of the emergency medical services are described in the Health Care Act and more specific requirements are stated in the associated decree. In England the emergency medical service are not described in legislation. The responsibility to organise the service has been given to the National Health Service as a part of health care provision. The lack of associated legislation seems to be a structural difference in how service systems work in Finland and England and does not seem to have any effect on the service itself.

Both countries have a similar system for health care professionals' registration. In England however there is a different body for keeping registry for nurses and midwives (Nursing and Midwifery Council), physicians (General Medical Council) and other health and care professionals (Health and Care Professions Council) where as in Finland all health care professionals are registered within one body (Valvira). In England these bodies also keep closer watch on the professionals' fitness to practice. This is manifested in closer scrutiny in application, revalidation and audit processes.

Health and Care Professions Council in England requires higher education institutions to comply with their Standards of Education and Training. It requires the applicants to meet the requirements of good character and health as well as the Standards of Proficiency and Standards of Conduct, Performance and Ethics. The registrants have to revalidate their registration every two years and the HCPC monitors registrants Continuing Professional Development by auditing certain amount of revalidations.

In Finland the National Supervisory Authority for Welfare and Health, Valvira, is less interested in controlling health care professionals. The registration process is completed simply by submitting the application. Valvira then compares the application with the information sent by the higher education institution whether studies are completed. No revalidation is needed to keep registered and the registration is rarely cancelled. The principles of professional conduct and development are stated in the Act on Health Care Professionals and labour agreements but they are not monitored save for a serious criminal offence.

6.2 Education of paramedic practice

EDUCATION SYSTEMS

Education system is fairly similar in both countries. Englishmen start their primary education earlier and education is compulsory until the age of 18. In Finland the education is compulsory until the age of 16. Division into primary, secondary and tertiary education is similar as well as the role of post-secondary non-tertiary education.

TABLE 18: Education systems.

	Finland	England
ECTS in use	Yes	No
Free tertiary education	Yes	With bursary
Unified application system	Yes	Yes

Both countries use European Qualifications Framework to compare levels of education. Finland has widely adopted most of the other tools provided by the European Qualifications Framework, most significant of them being European Credit Transfer System. England does not use ECTS or any other tools besides the actual table presenting levels of education with corresponding qualifications.

Virtually all education in Finland is free of tuition fees. This includes all undergraduate and most postgraduate programmes in universities and universities of applied sciences. In England higher education tuition fees have an upper limit of £9,000 a year and many universities have adopted this upper limit as their standard. Studies in England are often funded with state backed student loan. Some fields of education have bursary schemes in place to fund studies. For example the NHS funds programmes in nursing and paramedic practice in most places.

All higher education institutions in Finland are mainly publicly funded although private funding through donations and sponsorship has become more important. No student fees are collected. In England the funding of higher education institutions is more varied. Funding comes from Higher Education Funding Council for England, tuition fees and private fundraising. Bursary schemes also use public money to pay for tuition fees in some cases.

Application to higher education is similar in both countries. Both have web based application system, a tariff system for changing previous qualifications into numerical and comparable data and the utilisation of entrance examinations. The application system in Finland is state funded and thus free for users whereas in England there is a fee for using the UCAS application system.

PROGRAMMES IN PARAMEDIC PRACTICE

TABLE 19: Length and level of paramedic education.

	Finland	England
Level of education	Bachelor's degree	Diploma HE
Length in years	4	2
Length in hours	6400	3900
Length in credits	240 ECTS credits	120 credits

The obvious first difference in the programmes is the length and level to which they aspire. The Finnish programme being four years and leading to bachelor's degree and the English counterpart two years and leading to diploma in higher education, it is expectable to find major differences in the programmes. In Finland the bachelor's degree is the only qualification in higher education of paramedic practice.

In Finland paramedic is not a registered profession. The paramedic programme includes nursing proficiencies and paramedics are registered as nurses. In England paramedics are independent registered professionals and the training includes only paramedic studies.

Aims and outcomes

Both programmes aim to create highly trained professionals for advanced level pre-hospital emergency care. Paramedics are seen as independent professionals and both programmes emphasise proficiency in clinical skills and decision-making.

The Finnish programme is based on the nursing competences and leads to the registration as a nurse. Thus opportunities to be employed inside hospital in A&E and intensive care are also advertised.

Structure of studies

The programmes in Savonia and LJMU are structured very differently. The programme in LJMU has ten modules, five each year. They are larger structures containing smaller issues relating to the topic. For example Developing Paramedic Practice includes documentation, basic life support, manual handling, communication, mental health, obstetrics etc. All modules have a total of 240 learning hours. Completion of clinical practice is embedded into one module each year and does not have a module of its own.

In Savonia the modules are mainly shorter and more specific. The whole programme consists of 52 modules. Module lengths range from 60 hours (2 ECTS credits) to 690 hours (23 ECTS credits). Ma-

majority of basic and professional studies are joined with the nursing students. Paramedic specific studies are also divided into shorter modules with topics such as ethics, patient handling, leadership and pharmacology forming their own modules. Each clinical placement is also its own module.

Credit accumulation differs between the programmes. Savonia uses ETCS credits in its curricula. In the LJMU all modules consist of 240 learning hours leading to 24 credits. Clinical practice does not award credits but the record of hours is of course kept.

According to European Qualifications Framework one year of full time studies awards with 60 ECTS credits and consists of 1,500 to 1,800 hours of work. In Savonia UAS each year has calculatory value of 1,600 hours. Each year in the paramedic programme in LJMU consists of five theoretical modules 240 hours each and 750 hours of clinical practice. This totals to 1,950 hours each year which is above ECTS average. Because of these major differences in credit accumulation paramedic programme in LJMU will not be converted into ECTS credits.

It is noteworthy that LJMU has more theoretical study hours than what is required from a diploma of higher education course by the College of Paramedics.

Clinical practice

In LJMU clinical practice is included in one module each year, whereas in Savonia each placement has its own module. College of Paramedics requires the diploma of higher education in paramedic practice 1,500 hours of clinical practice, of which 1,200 hours carried out in an ambulance. In Finland the Ministry of Education and Culture requires the degree programme in paramedic practice to contain 90 ECTS credits worth of clinical practice but does not specify the proportion of placements in pre-hospital care. Further on thesis worth of 15 ECTS credits is included in this requirement leaving 75 ECTS credits of actual clinical practice.

In Savonia the total amount of clinical practice is 75 ECTS credits. This is 31 % of the total of 240 ECTS credits in the whole programme. The hours completed in practice differ a bit from module to module but in Savonia one ECTS credit requires 27 hours of work. Thus the total clinical practice hours in the programme is 2,025.

In Liverpool John Moores University the programme consists of 1,500 hours of clinical practice. It is advertised that half of the course is done in clinical practice. However according to the programme documents the amount of theoretical studies is 2,400 hours. This gives 38 % proportion of clinical practice.

The proportion of pre-hospital emergency care placements and other placements in LJMU is also different. From the total of 43 weeks of clinical practice 30 weeks are in pre-hospital care (70 %). In Savonia 35 ECTS credits out of the total of 75 is spent in pre-hospital care (47 %). This also means that the actual placement time in an ambulance is actually longer in LJMU (30 weeks vs. 23 weeks).

Training in emergency driving

Both programmes contain some theoretical training for emergency driving. In Savonia University of Applied Sciences the desired competence is described so that *the student knows the legislation associated with the emergency driving, knows the principles of safe driving and knows how to use safety equipment in an ambulance*. In Liverpool John Moores University there are no official learning outcome concerning emergency driving but it is addressed in module Developing Paramedic Practice.

Ambulance services in England however provide their employees with a standardised course for driving emergency vehicles. In Finland some employers utilise commercial driving courses for emergency driving. These courses are not mandatory and there is no data on how many employers use them. It is safe to say that a vast majority of employees have had no training for emergency driving.

There was no sufficient data to compare road traffic collisions involving ambulances between the countries. There is however a major difference in the way paramedics are trained in emergency driving. Thus it would be very interesting to see if more extensive training in England has an effect on the safety of emergency driving.

Delivery of curriculum

Both universities use modern range of teaching methods with emphasis on student participation. Savonia uses an instrument called Open Innovation Space with a purpose to combine theoretical knowledge and work-based learning to research and innovations activities. Teachers in LJMU utilise problem based learning in moderate and prudent manner to aim at the same target. Both universities seem to use coherent strategy in teaching that has the student and learning in focus and is able to evolve.

Simulation training is seen as a fundamental teaching method in both universities. It is undoubtedly the method of choice for teaching many aspects of emergency care. Both universities are also building new simulation environments to meet the needs of their education.

Assessment and student development

Both universities base the assessment of studies on an assessment strategy and pre-determined criteria for modules. However the universities have very different approach on individual student's assessment.

In Savonia one teacher responsible for the module normally does assessment of a student. If the module has more than one part that are assessed separately the final assessment is gathered by the teacher responsible for the module. In the LJMU the assessment of a single module always goes

through the first marker, moderator, moderation team, external examiner and the assessment board.

The difference in the assessment strategy is most probably culture related. It does rise a question of how much time is used in the assessment process. Also what additional value does five-tiered process gives compared to one-tiered? In the author's opinion the pre-determined module assessment criteria and a working rectification possibility assures the student rights of a correct assessment. It would be interesting to see further research into this matter.

Both programmes have a systematic plan for the development of professionalism throughout the studies. In Savonia smaller modules build up yearly themes which follow a development from a beginner to an expert. Nursing and paramedic studies are taught somewhat simultaneously. Emphasis is on the nursing studies on the first two years and on the paramedic studies in the two last years. Term expert is used in the curriculum quite liberally as if the student was an expert once graduated.

In Liverpool John Moores University the modules are also timed keeping the development of a student in mind. The curriculum in LJMU is more prudent in its use of desired outcome of studies. It uses term professional and professionalism which in author's opinion describe the favourable outcome very well. There is only one group of students each year and they only have studies within the paramedic programme. Because of this the studies seem to flow more coherently than in Savonia. It seems like a very good layout to have a certain amount of theoretical studies at the university followed by clinical practice.

Quality and feedback

Both institutions have a structured quality programme but again the basis and execution of the quality work are a bit different. In Finland the Ministry of Education and the Finnish Higher Education Evaluation Council monitor the universities of applied sciences and their programmes. It seems however that this official monitoring is not very regular. Thus Savonia has implemented a separate quality programme to ensure the quality work in practice.

In England all health care education programmes have to be approved by the Health and Care Professions Council and all paramedic programmes furthermore by the College of Paramedics. Both of these instances also require a regular revalidation of the programmes. These validation and revalidation processes build a foundation for keeping up the quality of the programmes. Liverpool John Moores University also has its own quality framework, which gives tools for daily and yearly quality assurance.

Student feedback is gathered coherently and similarly in both institutions. The feedback is also seen important for the quality assurance and development of the programmes. Student unions have a similar role in both institutions naming representatives for official bodies and upholding student rights.

7 DISCUSSION

CONCLUSIONS

Emergency medical services

Public emergency medical service was organised in England right after the Second World War. In Finland the service was organised only in the beginning of 1970s. Similar head start can be seen in the training of personnel. The development of higher education in paramedic practice is similar in both countries.

England has virtually one provider of emergency medical services, National Health Service. The service is provided by regional ambulance services and it is completely publicly funded. In Finland the responsibility of providing emergency medical services is on the hospital districts. They can provide the service themselves or buy the service from another public or private service provider. The use of emergency medical services is free of charge in England. In Finland the user has to pay a fee for each call leading to transport or treatment at the scene.

Finland has a clear tiered response system. First responders, basic life support units, advanced life support units and helicopter emergency medical services are used according to pre-determined criteria. England does not have a strict tiered response system. Some units do however have a paramedic onboard whilst some do not. Thus there is a division into basic and advanced life support units. First response schemes and helicopter emergency medical services do exist but they vary across the country.

England does not have common minimum requirements for the ambulance work. Minimum requirements apply to paramedic registration but no common standards for assisting personnel were found. In general medication sets, performed procedures and training differ a lot regionally.

The medication and procedures used in pre-hospital emergency care are very similar between the countries. Most notable differences are the lack of CPAP therapy and vasoactive medication in England and the lack of antibiotics in Finland.

Helicopter emergency medical service is state funded in Finland. All but one of the six units have a physician always onboard. The units operate 24 hours a day save for adverse weather conditions. In England the helicopter emergency medical services are run on charity basis. Most units have a physician on board and they operate during daylight hours.

Finland has one unified emergency response centre administration with six emergency response centres handling all police, fire service and medical emergency calls. All operators undergo a standardised training for call handling. In England police, fire service and ambulance all have their own emergency call centres. Operators are locally trained.

Regulation of emergency medical services in Finland is heavily based on legislation. The law dictates the responsibilities of all parties from clinical work to ministry supervision. England does not have any dedicated legislation concerning emergency medical services. The work is organised regionally and supervised by the National Health Service officials. The Ministry of Health supervises the National Health Service.

Paramedic is not a registered profession in Finland and paramedics are registered as nurses. Once registered there are no requirements for staying registered or any revalidation processes. In England paramedic is an independent registered profession. There are professional standards, which have to be followed, and a regular revalidation of registration is required.

Paramedic programmes

The Finnish degree programme in paramedic practice takes four years. Liverpool John Moores University has a two-year programme leading to diploma in higher education. Some universities in England offer three-year bachelor's degree programmes in paramedic practice. It is confusing that different institutions in England provide so different courses in paramedic practice. This problem was also recognised in the Paramedic Evidence Based Education Project that should result in change in this matter.

The Finnish paramedic programme contains a nursing degree and paramedic specific studies make up only one third of the whole course. A lot of the nursing studies are essential or highly supportive to the pre-hospital emergency care. For this reason it was not attempted in this research to compare the specific studies.

Integrated nursing degree gives the Finnish paramedics a very wide view over the health care field. This insight and experience can and should be used to develop out-of-hospital care to reach more non-emergency patients. Developing out-of-hospital care could save resources. Currently in author's opinion paramedics in Finland are over-trained for both pre-hospital emergency care and in-hospital positions individually.

The programmes are constructed differently. The programme in Liverpool John Moores University has ten modules of the same length. The programme in Savonia University of Applied Sciences has 52 modules with varying lengths.

The students in Liverpool John Moores University spend 30 weeks of practical placement in an ambulance whilst their counterparts in Savonia University of Applied Sciences have 23 weeks of ambulance placements.

Both programmes contain a short introduction into emergency driving. In England all new employees undergo a three-week standardised emergency driving course. In Finland few of the employers

provide employees with any training in emergency driving. This is a major weakness in the Finnish emergency medical services system that should be immediately corrected.

Delivery of curriculum and used teaching methods are very similar. In Liverpool John Moores University the teachers of paramedic practice teach their students all modules. In Savonia University of Applied Sciences teachers of paramedic practice teach only paramedic studies while teachers from other fields teach their own modules. It is of course a good thing that specialists teach their own specialty but it can be a problem when applying taught into pre-hospital setting.

Assessment of theoretical and clinical skills applies similar principles in both institutions. Both use final testing to ensure sufficient level of theoretical and clinical skills in the end of the programme. In Savonia University of Applied Sciences teachers usually assess the modules on their own. In Liverpool John Moores University the assessment is a complex procedure with five tiers. Author fails to see the point in this process and a suggestion is made to simplify the assessment process.

Both institutions use a structured and well-described quality programme. Quality is seen as a key element in education. Active student unions participate in both institutions' decision-making processes.

Higher education in England does not use the full potential of the European Qualifications Framework. In the author's opinion England should adopt the European Qualifications Framework in its full to make it easier to compare the programmes and ease the movement of students and qualified workforce to and from England.

RELIABILITY AND VALIDITY

The objectives of this research were to compare the emergency medical services in Finland and England and to compare the paramedic programmes in Savonia University of Applied Sciences and Liverpool John Moores University. The research was successful and gives a wide understanding of the subject in the defined setting.

No conflicting information was found in relation to the WHO report on the European emergency medical services. Interestingly a bachelor's thesis was produced in the spring 2014 comparing paramedic programmes between Saimaa University of Applied Sciences and Edge Hill University (Suhonen & Tolari 2014.) The setting for the thesis was slightly different but the results were in conjunction with this research.

The chosen research method proved its abilities and disabilities in practice. Author had little official information about the subject from England beforehand. Presumptions rising from the Finnish emergency medical services were also deliberately avoided. This led to as open approach as possible. In hindsight this was the right decision as the work evolved very much throughout the research process.

The chosen method had its known drawback. The results can be described as shallow and they do sometimes raise more questions than what they answer. This was known beforehand and further research with different approaches is needed.

and effort it was well worth it.

The amount of internet-based references was a bit of a worry. Only official sources of information were used and today most of official information is found in the internet. That makes it easy for everyone to access the information but on the other hand requires a lot of patience and a keen eye to recognise and analyse the validity of the information. This is true in case of this research as well and some of the official information was found to be out-dated.

This thesis works also as an introduction into both countries' EMS systems providing official sources of information for everyone that is interested in reading more about addressed topics. Thus the amount internet-based references is acceptable.

In Finland with new legislation the emergency medical services are quite homogenous throughout the country. Major variance still exists in who provides the service. Minor variances also exist for example in the medication sets. In England despite minimum standards and collaboration groups, variances between the ambulance services seem to be bigger. This research has tried to take these differences into consideration but local factors should be taken note of while generalising the results.

The paramedic education is very similar throughout Finland. All eight institutions apply the same paramedic programme approved by the ministry of education. There is some variance in the curricula but the outlines and outcomes of the programme are the same in all institutions. In England the situation is dissimilar. Paramedic practice is taught on three levels of education. However the programmes are strictly guided by the College of Paramedics and paramedic registration by the Health and Care Professions Council. Thus the outcomes should be fairly similar in all institutions.

In this research the paramedic education in one Finnish institution was compared to a different level programme in one English institution. For this reason a careful consideration has to be made if trying to generalise the results into other institutions or programmes.

Writing the thesis in English was important to make it accessible to both of the involved parties. It is safe to say that English skills to understand this work can be expected from students and teachers in Finnish higher education, rather than to expect such skill in Finnish from their English counterparts.

Field trip type of excursion to Liverpool was an important part of this work. It gave the opportunity to discuss with the teacher at Liverpool John Moores University face to face. This way it was easier to get acquainted with the programme as well as with the English emergency medical services. The discussions with the teachers played a key role in understanding some of the key concepts used in this work thus contributing into the reliability.

Spell-checking program was used in writing the thesis. Teachers in Liverpool John Moores University were used to confirm whether concepts and terms were understood and used correctly. This increases the reliability and validity of the research.

Today, particularly in the world of research, English is the main working language if one wants to be understood anywhere outside of Finland. Conducting the research in English makes this research more useful. It also proved a good challenge and training for the author in scientific writing.

SUGGESTIONS FOR FURTHER RESEARCH

This research only scratched the surface of most addressed topics and all of them could be compared in the individual studies. The first question that was raised by this work is that if the longer course in Finland is better or not. This question could be scrutinised from different angles. Are there differences in knowledge and skills of student paramedics and paramedic professionals? Are there differences in the actual patient care?

The final assessment of theoretical and clinical skills was not compared in this research. This topic would make a fine research on its own.

Another topic that was raised was the emergency driving. It would be very interesting to know if better education in emergency driving has an effect on attitude towards driving an emergency vehicle or the amount and severity of road traffic collisions involving ambulances.

Generally the benchmarking of the paramedic programmes should be continued. This will without a doubt need a lot of different types of research.

Some major differences were also found in the provision of emergency call handling. Deeper research into this topic would be very interesting as well.

In general the lack of paramedic specific research is apparent in both countries. It would be important for the development of the profession to have its own research activities organised. The state of paramedic research in Finland would make a research topic of its own.

Finally paramedic practice is and will be developing in the following years. This also means that this research will not stay valid for very long. Thus another overview on the topic is needed at some point.

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