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分担研究報告書
救急外来に特化した電子カルテシステムと臨床診断意思支援システムの開発による
医療安全の向上に関する研究

救急外来に特化した電子カルテシステムの開発

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研究要旨

救急車出場台数が年々増加している事を鑑みると、効率的に患者の情報を入力できる電子カルテシステムの開発が必須である。我々は、救急外来で診察する際に必要なバイタルサイン、身体所見、神経学的所見を多数の教科書、文献から抽出し電子カルテを作成し、ヒアリングを行った。現状では救急のワークフローを阻害する可能性が高いことから、更なる改善が必要である。

A. 研究目的

現在日本において救急外来に特化した電子カルテ (EDIS) を開発している企業は無い。現時点では病棟や外来で使われている電子カルテシステムをそのまま導入しているか、その一部をカスタムする、または外来や病棟で使われている電子カルテシステムは救急外来に導入せず紙カルテをしていると考えられる。

今後電子カルテの導入は避けて通ることは出来ず、また救急車出場台数が年々増加している事を鑑みると、効率的に患者の情報を入力できる電子カルテシステムの開発が必須である。

この研究では、救急外来の診療効率を改善させ、医療安全を向上させる目的で EDIS を開発することである。

B. 研究方法

救急外来で診察する際に必要な、バイタルサイン、身体所見、神経学的所見を多数の教科書、文献から抽出した。また見逃しを減少させる為に、症状から見逃すと致命的となる疾患の抽出を行い表示させる機能を電子カルテの中に導入した (上村担当の臨床診断意思決定システムを導入)。

それらを救急外来における診療の流れに合わせて配置し、電子カルテの開発を行った。

(倫理面への配慮)

情報の漏洩等については防止に努めた。

C. 研究結果

完成した電子カルテを救急医、後期研修医、初期研修医に使用させた所、肯定的な意見としては、

- ・今まで陽性所見 (身体所見で異常があるもの) しかカルテに記載しないことが多かったが、陰性所見 (診察した結果、身体所見で異常がない) も簡単に入力することが出来るというものであった。忙しい救急医は、患者の身体所見で陰性所見を取っているが、記載する時間が制約されているため陰性所見をカルテに記載することがしばしば抜けることが多い。すなわち、見ているがカルテには記載されていないため、見ていないことになってしまう。これは後日医療事故として問われたときに、問題になることがある。よって容易に陰性所見を入力できることは非常に有意義であることが示せた。

否定的な意見として、

- ・インターフェースが見にくい
- ・項目が多すぎて入力に時間がかかる
- ・入力する際にタイムラグがある
- ・慣れるまでに時間がかかる

といった負の面が多く聞かれた。

これらの意見は、現状では救急のワークフローを阻害する可能性が非常に高いことを表している。

D. 考察

主に電子カルテの開発は企業主体で行われ、完成された電子カルテの導入後に救急医が使いやすいようにインターフェースやボタンの配置などを変更することは困難であり、変更できたとしても莫大な金額が発生することが予想される。画像の取り込みや手書きツールが利用可能となった File maker 12 を使用し更なる改良を行う。

使いにくいインターフェースは作業効率を落とし死亡率を上昇させる報告が散見され、負の面もあるため綿密な計画と慎重な導入が必要である。

E. 結論

次年度において更なる改良を行い、実地試験を行う予定である。

F. 研究発表

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G.知的財産権の出願・登録状況（予定を含む）

1. 特許取得

特になし

2. 実用新案登録

特になし

3. その他

特になし

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臨床診断意思決定支援システムの開発

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研究要旨

救急外来における電子カルテシステムに搭載する機能の一つである臨床診断意思決定支援システムを開発する。開発するに当たり、主訴から想起される鑑別疾患に関する文献を収集し整理した。

A. 研究目的

本研究の目的は、救急医療現場における医療関係者の負担を軽減し、かつ救急医療における診療の質を担保することで医療の安全性を高める電子カルテシステムを開発することである。

この電子カルテの中に搭載する機能の一つとして臨床診断意思決定支援システム (CDIS) がある。

本研究では、多数の教科書や文献から主訴から想起される鑑別疾患をまず”内科的に”羅列し、その後救急外来で見逃すと致命的なる鑑別疾患別に並び替えるという作業を行った。

B. 研究方法

救急外来で使いやすい電子カルテ (EDIS) の開発には以下のことを注意し行っている。

- ①タイムリーに、正確なデータの収集や分析が出来る
- ②使用方法が容易であり、ユーザーが使用したいと思えるシステム
- ③明確、かつ直感的なデータの表示
- ④容易に目的の情報が見つかることが出来る
- ⑤簡単な作業は自動化し、作業負担を増やさずに仕事の流れを良くする
- ⑥救急医療 業務の流れに合わせて設計されている。

また EDIS の中で医療安全の向上や、臨床上の

判断根拠の共有を図ることでより良い医療を提供するシステム (CDIS) として特に以下の2つに関して多数の教科書から作成を行う。

- I. 患者の主訴からの鑑別疾患表の作成
- II. 救急外来において見逃してはならない疾患の表の作成

I. に関しては、多数の参考書や文献が出ている為、それらを整理した。

II. に関しては、多数の和本で書かれているが、疫学データに基づく表は存在しない。救急医学の成書にも主訴から見逃しては成らない鑑別疾患が書かれている章は 10 程しか無い。

主な主訴に絞り、救急専門医 5 人の意見を取り入れて作成した。

(倫理面への配慮)

情報の漏洩等については防止に努めた。

C. 研究結果

- I. においては 60 の鑑別疾患表を作成した。
- II. においては 10 の鑑別疾患表を作成した。

D. 考察

内科的な鑑別疾患と異なり、救急医療ではまれでも致命的となる疾患が見やすいように羅列さ

れなければならない。また羅列するに当たっても直ぐの介入が必要である疾患、時間をおいて処置をしてもよいが放置することにより状態が悪化する疾患、他の専門医の外来に依頼する疾患の3つに鑑別される。これらに注意して作成を行った。

救急医学の成書で書かれている鑑別疾患表の作者数人にどのような基準で作られたのかをメールにて問い合わせた所、疫学データやEBMに基づいたものではなく、感覚的なものだとの回答があった。

E. 結論

救急医学において主訴から致死的な疾患を想起することはきわめて重要である。しかし疫学データやEBMに基づく鑑別疾患表を作成することは現段階では困難であり、専門医の意見による鑑別疾患表が限界である。

開発する電子カルテシステムにおいて、主訴と疾患の関係性が疫学研究から明らかとなった際、より良い鑑別疾患表が作成されるであろう。

F. 研究発表

1. 論文発表

特になし

2. 学会発表

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G. 知的財産権の出願・登録状況（予定を含む）

1. 特許取得

特になし

2. 実用新案登録

特になし

3. その他

特になし

III 研究成果報告

研究成果の刊行に関する一覧表

雑誌

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Development of information systems and clinical decision support systems for emergency departments: a long road ahead for Japan

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Development of information systems and clinical decision support systems for emergency departments: a long road ahead for Japan

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ABSTRACT

Emergency care services face common challenges worldwide, including the failure to identify emergency illnesses, deviations from standard treatments, deterioration in the quality of medical care, increased costs from unnecessary testing, and insufficient education and training of emergency personnel. These issues are currently being addressed by implementing emergency department information systems (EDIS) and clinical decision support systems (CDSS). Such systems have been shown to increase the efficiency and safety of emergency medical care. In Japan, however, their development is hindered by a shortage of emergency physicians and insufficient funding. In addition, language barriers make it difficult to introduce EDIS and CDSS in Japan that have been created for an English-speaking market. This perspective addresses the key events that motivated a campaign to prioritise these services in Japan and the need to customise EDIS and CDSS for its population.

INTRODUCTION

In recent years, the momentum of the technological revolution brought about by health information technology (HIT) has increased. Healthcare reforms, hospitals and regional healthcare alliances have increasingly taken advantage of HIT. Adoption and widespread use of electronic forms for record maintenance have led to increased convenience and easier access to medical records.

Digitisation of the information used in emergency departments has necessitated a consideration of the unique aspects of emergency department care and information handling. For example, general outpatient treatment and emergency care differ in terms of medical examinations and locations within the hospital. General outpatient treatment can vary in duration. In contrast, emergency care involves short-term treatment and efficient performance of complex tasks. Examinations must be completed quickly since many patients exist in highly critical situations. Interruption of examinations is common because of high patient volume. Therefore, the use of a common electronic health record system to meet these different needs could be problematic.¹⁻³ For this reason, hospitals in many countries use emergency department information systems (EDIS) designed specifically for use in emergency departments. In addition, clinical decision support systems (CDSS) that are designed

to reduce medical errors are often used as part of the hospital electronic health record system, which also includes EDIS.

Electronic medical record systems in medical facilities in Japan are, however, mainly designed for use in general outpatient care wards. EDIS is not yet well known, and electronic health record systems designed specifically for use in emergency departments are not available. What follows is a discussion about the history of the development of EDIS and CDSS, their present use, an examination of the factors that impede the adoption of these systems in Japan and possible issues in the future based on the current situation in Japan.

DEFINING HIT, EMERGENCY DEPARTMENT INFORMATION SYSTEMS, AND CLINICAL DECISION SUPPORT SYSTEMS

HIT is mainly used in the following areas: the management of administrative and medical equipment; the maintenance of patient records, within and outside hospitals; the provision of information to patients; and the transfer of medical information. Countries throughout the world have adopted HIT to reduce medical costs and errors and to ensure safety.⁴⁻⁶ HIT was developed primarily for use in general outpatient wards. However, emergency departments require customised systems that reflect the unique examinations and treatments required in emergency care,³ which are EDIS.^{1 3 7} EDIS is broadly defined as 'an electronic medical record system that increases the efficiency of emergency patient examinations and treatment'.³ It is not simply a record of examinations but is also composed of several core functions to support clinical care, such as patient and order entry, triage, result reporting, document management, CDSS and risk management, patient and resource tracking, and discharge management.³ Core administrative EDIS functions comprise hospital and departmental statistical metrics management; coding and billing, including interaction with insurance carriers and provision of information to third parties; integration with public health and other registries; disaster management; disease surveillance; and early detection and management during outbreaks of new infectious diseases or terrorist attacks. Thus, the responsibilities of EDIS include medical care, hospital administration and national policy making.^{3 8}

Original article

CDSS improve medical safety by reducing errors in judgment, allowing information sharing that forms the clinical basis for decision making,⁹⁻¹² providing information about drug allergies, contraindications for drugs in combination, test results associated with drugs (eg, digoxin and low serum potassium levels), drug dosage adjustments (eg, opioids or insulin), medication characteristics, special considerations for elderly patients, imaging technique ordering for patients with pacemakers and proposal of a set of appropriate diagnoses.¹³⁻¹⁵

BARRIERS TO ADOPTION OF EDIS AND CDSS

Although the merits of EDIS and CDSS are widely acknowledged in the medical profession, the USA has been slow in adopting these new technologies. Landman *et al* first reported the prevalence of EDIS in emergency departments in the USA;¹⁶ they found that 1.7% of hospitals had a comprehensive EDIS system, which included an ordering system, an information interoperability function and CDSS, while 12.3% of hospitals had a basic EDIS with only some of these functions. Barriers were reported by the authors, including the costs of integration and maintenance, staff members reacting adversely to changes in their existing work conditions, uncertainty about system reliability, difficulty with use, suspicions that the technology would soon become outdated and concerns about maintaining confidentiality; all of these deterred the adoption of EDIS.¹⁷⁻¹⁸ In addition, some studies have reported that CDSS can be difficult to use, causes inefficiencies and may increase medical errors and death rates.⁷

PRESENT STATUS OF HIT, EDIS AND CDSS IN JAPAN

The number of medical facilities in Japan switching from paper to electronic medical records has increased in recent years. According to a survey conducted by the Japanese Ministry of Health, Labour and Welfare, 969 of 8838 hospitals (11%) and 9077 of 98 609 clinics (9%) had adopted electronic medical record systems by 2008. In May 2010, the Japanese government's Information Technology Strategic Headquarters announced its new Information and Communication Technology Strategy. This strategy is supposed to offer a powerful stimulus for cooperation among healthcare facilities; work has already begun on standardising forms and terminology codes and on forming healthcare information networks.

Unfortunately, the concept of EDIS is not well known in Japan; as a result, no Japanese companies manufacture electronic medical record systems designed specifically for use in emergency departments. In addition, EDIS, which was first developed in English-speaking markets, was difficult to introduce in Japan because of language barriers. However, the value of EDIS is apparent when reflecting on past events. For example, in 1995 the members of the Japanese 'Aum Shinrikyo' cult released sarin nerve gas in the Tokyo subways during morning rush hour, causing 12 deaths and over 5500 injuries.¹⁹ This acetylcholinesterase inhibitor can be fatal within minutes to hours. However, no electronic communication between hospital staff, the police or the government existed. An EDIS would have allowed early detection, diagnosis and a proper initial response to the situation.

CDSS is not widely used in Japan. Although several CDSS initiatives are currently underway, many are stand-alone, non-standardised systems. For CDSS to be more widely employed, EDIS that use standardised medical terminologies or are able to switch to a standardised system are required as information bases. CDSS must be compatible with EDIS and standardised within hospital systems and across medical facilities. Such

systems aid the accumulation of valuable information for evidence-based clinical medicine. For example, the Systematised Nomenclature of Medicine Clinical Terms is one of the largest standardised computer terminology databases in the world. However, language differences make the system extremely difficult to adopt in Japan. Thus, a system suited to the unique needs of Japan is needed and is already in progress.²⁰ Other barriers to the adoption of CDSS from an English-speaking market are differences in the types of drugs, dosages and diseases. For example, Kawasaki disease is relatively common in Japan but rare in Western countries. Thus, systems for appropriate diagnoses developed overseas could not be used in Japan without modification.

Recently, the strategy has also been a stimulus for cooperation between healthcare facilities in prehospital, where work has begun on standardising forms and terminology codes and forming healthcare information networks. The Canadian Triage and Acuity Scale²¹ and the newly developed Japan Triage Acuity Scale are being used increasingly in prehospital in Japan.

DEVELOPMENT OF EMERGENCY MEDICAL CARE SYSTEM IN JAPAN

Delays in the treatment of critical patients became a problem in Japan during the 1970s. The number of traffic accidents increased rapidly because of the increased use of automobiles, leading to many hospitals turning away ambulances and refusing care to accident patients. To counter this situation, emergency medicine was created as a distinct specialty in Japan. Before the establishment of emergency medicine in Japan, there were no emergency physicians; emergency patients were treated by surgeons and internists without specific training in emergency medicine in a multispecialist model.²²

To prevent the concentration of patients in just a few emergency hospitals, emergency medical facilities were designated as primary, secondary or tertiary care facilities.²³ Patients who could not be treated at a primary care facility would be transported to a secondary or tertiary care facility. Paramedics were able to choose between healthcare facilities depending on the patient's condition. Primary care facilities are clinics without beds; these accept patients on a walk-in basis who do not require inpatient care. Secondary care facilities examine and treat patients with moderately severe conditions and provide inpatient care; they accept walk-in patients and those transported by ambulance. Tertiary care facilities offer intensive treatment in all medical specialties to critical patients; most emergency surgery is performed in such facilities. In 2010, there were 605 primary care, 4169 secondary care and 220 tertiary care facilities in Japan.

Secondary or tertiary care facilities are not limited to trauma or burn patients, but also include non-trauma patients. In addition, walk-in patients can seek medical attention at any facility. Because there are too many secondary care facilities against the number of emergency physicians, many secondary care emergency hospitals might not be able to deliver appropriate emergency care for all types of medical/surgical emergencies. Accordingly, the selection of appropriate hospitals to which to transport emergency patients is a critical issue that requires skill in differential diagnosis in emergency medical technicians, which may be difficult to apply at the scene. Moreover, most secondary care emergency hospitals are staffed by non-emergency specialists, whose specialties may not be appropriate for any given patient, during the night or on holidays. This

may account for many refusals by emergency hospitals to accept some patients.²²

Most tertiary care facilities have 10 to 30 beds in their Intensive Care Units (ICUs), and staff size ranges from several doctors to more than 30 doctors per centre. The principal mission of the physicians in the emergency departments in these centres is to provide trauma or non-trauma/critical care service to emergency patients (ICU-type model). Indications for admission to emergency medical service centres are deteriorating vital signs, as judged by emergency medical technicians. Thus, only the most critical patients are admitted and the admission rate is close to 100%. When non-critical patients visit an emergency medical centre attached to a hospital, they are guided to a separate emergency room (ER) where doctors belonging to other specialties provide care.²²

In 2003, ER and Western-style models were introduced into Japanese emergency medicine. Thus, three styles of emergency medical care coexist: the multispecialist model, the ICU model and the ER model. In 2007, a national survey was conducted of Japanese Association for Acute Medicine emergency physician-designated facilities. Two hundred and forty-eight of 420 facilities returned valid questionnaires (88% response rate); 82 facilities (33%) reported that their emergency departments were functional 24 h a day and 68 (27%) reported that their emergency department operated only during certain times of the day. Of the 4230 emergency medical facilities throughout Japan, most operate on either the multispecialist or ICU model; only teaching hospitals in major cities use the ER model.²²

Thereafter, the number of trauma patients decreased as a result of developments in automobile technology, mandatory use of seatbelts and increased penalties for driving under the influence of alcohol. At the same time, the number of patients with non-traumatic injuries admitted to emergency departments began to increase. In 2010, approximately half of these patients were older adults. All expenses were and continue to be covered by local governments via tax revenues, entailing no charge to patients for care and/or transportation. This has led to an increase in the volume of patients visiting hospitals by ambulances and has lengthened the time to reach hospitals and the waiting times once there.

Presently, there is a need to coordinate care for patients in the emergency departments in Japan. Care coordination has been defined as '... the deliberate organisation of patient care activities between two or more participants (including the patient) involved in a patient's care to facilitate the appropriate delivery of healthcare services'.²⁴ When a patient is brought to the hospital with disturbances of consciousness, the emergency physician is responsible for contacting potential primary care physicians and, after treatment, searching for suitable hospitals to transfer the patient to if there is no social worker available to do so. These administrative duties distract emergency physicians from their main duty, which is to provide emergency care. Therefore, EDIS and CDSS would be useful tools for improving the quality and efficiency of emergency care.

JAPANESE EXPECTATIONS FOR EDIS AND CDSS

The implementation of EDIS and CDSS in Japan must address issues specific to Japanese society with respect to the education of physicians. In emergency departments, rare diseases and medical complications must be considered. If not, serious consequences may result, even if the patient is seemingly well (eg, walk-in patients with subarachnoid haemorrhage or asymptomatic acute myocardial infarction on arrival at the hospital). The best approach emphasises ruling out serious and/or

emergency presentations rather than using the traditional approach of reaching a diagnosis based on clinical observations, which is the main approach used in medical education in Japan. Emergency medical education, which emphasises ruling out critical diseases and those requiring emergency medical attention, has yet to have a serious impact as a method of education. In addition, according to the Japanese Ministry of Health, Labour and Welfare, only 1945 physicians (0.7%) of a total of 271 897 were practising emergency care in Japan in 2008. Therefore, in many hospitals, physicians from other medical departments who may not be adequately trained in emergency procedures are engaged in emergency practise.²²

If CDSS were used in the future to guide examinations, provide updated treatment guidelines and standardise treatments, the quality of medical care would be improved. Residents could acquire the latest information and be educated in the field of emergency medicine, and emergency physicians could use CDSS to identify important points during a systematised examination to help residents distinguish easily confused diseases.

This would be complemented by implementing EDIS, which would improve the effectiveness and efficiency of the emergency department through prioritising and coordinating its activities as well as matching the ever-changing therapeutic needs with available resources for patient care. Since this decision, in its knowledge and practise, is part of the intellectual core of emergency medicine, CDSS and EDIS are thus expected to help embody the *raison d'être* of emergency medicine as a speciality. Furthermore, this knowledge and skill, when formulated and applied well, would help advance efficient use of medical resources in medical facilities, their networks, the wider context of medical service provision beyond an emergency department, and certainly in emergency situations, such as large-scale incidents and disasters.

After the 2011 earthquake and tsunami,²⁵ Japan realised that unnecessary tests and excessive medical treatments should be reduced when usable resources are scarce, especially in times of disaster. In such situations, all medical personnel are needed. The use of EDIS and CDSS may lead to increased awareness of the importance of physical findings and simple tests. If testing protocols based on the accumulated data of the Japanese population can be created and included in EDIS and CDSS systems, then unnecessary tests and unfortunate consequences would be reduced, which would allow medical personnel to use available resources more efficiently.

In conclusion, EDIS and CDSS are significant improvements for practising evidence-based medicine, which continuously gathers and revises scientific knowledge. They are useful tools that could improve the efficiency and quality of emergency treatment. Hopefully, both systems would be adopted more frequently at healthcare facilities, leading to an accumulation of knowledge and an advancement of epidemiological research in Japan.

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Original article

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諸外国における
救急外来に特化した電子カルテシステム(EDIS)
臨床診断意思決定支援システム(CDSS)
と当院における取り組み

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国立保健医療科学院 政策技術評価研究部
佐藤 元

電子カルテが使いにくい! **背景**
⇒救急外来の特性に準じた
電子カルテシステムを作っている
企業が国内に無い!

病院前システム
どこでもMY病院
地域医療ネットワーク
災害情報システム
EHR, PHRなど

- 入力時間を短縮する
- ⇒ • データベースを同時にとることが出来ないか!?

背景

このフローを改善させる
電子カルテシステム: EDIS

安全喚起するシステム: CDSS
⇒ 開発が進められている

目的

救急外来のカルテ

- 入力時間を短縮する
- データベースが同時にとれる
- 致命的疾患の見逃しを無くす
- 教育として使う

目的

救急には
紙カルテ最高!!

電子カルテも
いいかな

1. 救急外来における電子カルテシステム(EDIS)
2. 臨床診断意思決定支援システム(CDSS)
3. 当院における取り組み

1. 救急外来における電子カルテシステム(EDIS)
2. 臨床診断意思決定支援システム(CDSS)
3. 当院における取り組み

救急外来における情報カルテシステムとは？ Emergency Department Information System: EDIS

“救急患者の診療や対応を効率化させる
電子カルテシステム”として言葉は定義



しかしEDISに必須の機能や標準的な定義は定まっていない

EDISが何故必要なのか？ Emergency Department Information System: EDIS

電子カルテは主に、
一般外来や病棟において開発されてきた
しかし・・・

一般病棟
一般外来や病棟では数日から長期に渡る治療に
重点が置かれる

救急外来
短期的な治療や複雑な(治療・診断が多科に渡るため)
作業効率の改善に重点が置かれる

ACEP. Emergency department information systems:
primer for emergency physicians, nurses, and IT professionals, April 12, 2007

EDISを導入することにより受けられる6つの恩恵 Emergency Department Information System: EDIS

- ・診察や患者マネジメントの効率化
- ・病院内での患者情報共有化
- ・病院間での患者情報の共有化
- ・安全面の向上
- ・教育
- ・疫学調査

Hospital-Based Emergency Care: At the Breaking Point 2007

EDISを導入することにより受けられる6つの恩恵 Emergency Department Information System: EDIS

- ・診察や患者マネジメントの効率化
- ・病院内での患者情報共有化
- ・病院間での患者情報の共有化
- ・安全面の向上
- ・教育 ←ここに着目
- ・疫学調査

←ここに着目

Hospital-Based Emergency Care: At the Breaking Point 2007

1. 救急外来における電子カルテシステム(EDIS)
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3. 当院における取り組み

診療診断意志決定支援システムとは？
Clinical Decision Support Systems: CDSS

“診断・治療・投薬ミスを抑制し医療安全↑”

救急外来のCDSSに求められる6つの機能

- Feedback
 - 薬剤アレルギー
 - 薬剤の併用禁忌
 - 薬剤と検査結果の相関関係
 - 薬剤用量調整
 - 高齢者の予後を悪くする薬剤の処方
 - ペースメーカー患者のMRI検査
- Data organization
 - 病院受診患者のデータを顯示する
- Proactive information
 - クリニカルパスやオーダーセット
- Communication
 - 採血値に異常があったときに臨床医に知らせる
- Expert advice
 - 治療ガイドラインの提示
- Reminder
 - 予防注射を次にいつするか

警告機能

ACCESS Medicine, CURRENT Medical Di & Tx Checker v4, Information Technology in Patient Care

実際の現場では
良いことばかりでは無い・・・

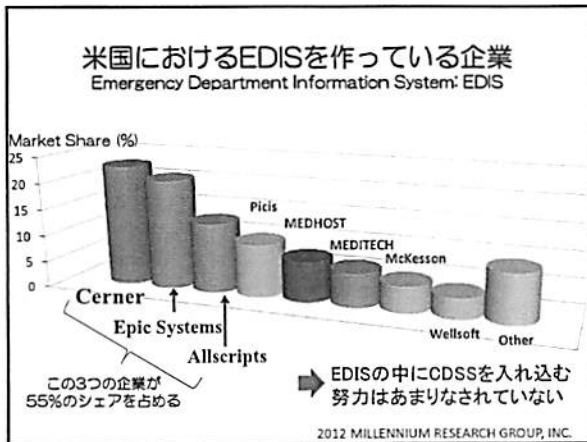
EDIS, CDSSを導入することにより受ける害
Emergency Department Information System: EDIS

使いにくいインターフェースにより死亡率上昇
Alexia, 2011; Graham and Dobes, 2011; Schultz and Swartz, 2010; Silver and Hamill

余りにアラームが多いと無視される
Pharmkat, 2010; Singh 2010

アラームの多さにより、疲労を認める
Pharmkat, 2010; Singh 2010

投薬補助システム
→レジデントでは処方誤りを減少
ベテラン医師は処方過ちが上昇
Sellier, 2009



1. 救急外来における電子カルテシステム(EDIS)
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