Research Square

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Experience of Bi-directional Referral Project between National Taiwan University Hospital Medical Center and Taipei City Hospital, Zhongxiao Campus Community Hospital

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Research Article

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Abstract

Background Overcrowding in medical center's emergency departments may threaten quality and safety of health services. The aim of our study is to retrospectively evaluate the practice of bi-directional referral project between National Taiwan University Hospital (NTUH) medical center and Taipei City Hospital Zhongxiao Branch community hospital.

Methods We retrospectively collected data from 38 electric and paper records of nineteen age- and gender-matched concurrent control patients without bi-directional referral and nineteen case patients who received bi-directional referral between NTUH Medical Center and Zhongxiao Community Hospital from January 1st, 2017 to November 30th, 2017. Patients admitted not due to bidirectional referral during the same period were used as a control group. Mortality rate, rate of transfer back to National Taiwan University Hospital, 11-point satisfaction rating scale are used as key performance indexes of quality improvement of clinical services. Satisfaction of the enrolled patients was evaluated with the questionnaires containing satisfaction rating scale 0-10. An independent samples t test was used to compare the means of variables between the ESI triage level 2 and ESI triage level 3 groups.

Results The ESI (emergency severity index) triage level 2 patients were significantly older than the ESI triage level 3 patients with non-significant p value of Levene's test indicating equal variance between the control and case groups, but there was no significant difference of average total satisfaction (TSAT) score of bidirectional referrals between these two ESI groups. Mortality rate is zero. Rate of transfer back to NTUH is zero. The average TSAT score of case group is 8.89± 0.81 while the average TSAT score of the control group is 9.40± 0.31.Both the average TSAT scores of the case and control groups were above 8.

Conclusion Early orienting of the admission of elderly patients on bi- directional referral system was demonstrated in this study. The parameters of quality of health care of the case group are comparable to those of the control group. The 0% mortality rate, 0% rate of transfer back to NTUH and good average TSAT score suggest that the referral program is safe and the quality of clinical services of these bi-directional referral patients is good.

Introduction

According to 2014 statistics from the ministry of health and welfare in Taiwan, there were 75,545 person-times with more than 48 hours of stay in the total number of 7.05 million person-times in all emergency departments. The number of person-times with longer time of stay (> 48 hours) in medical centers contributes to 9.1% of that in emergency departments of all hospital [1]. In spite of implementation of computer program of ambulance diversion strategy [2, 3], overcrowding of emergent department, especially in medical center's emergency departments, persists and may threaten quality and safety of health services [4].

. A previous literature demonstrated that increase of emergency department outputs can relieve emergency department overcrowding [5, 6]. In order to alleviate overcrowding in the emergency department, the director of Taipei City Hospital initiated the value-added bi-directional referral project between the National Taiwan University Hospital (NTUH) medical center and Taipei City Hospital community hospitals since April, 2015. The rationale behind the bi-directional referral policy between the National Taiwan University Hospital (NTUH) medical center and Taipei City Hospital community hospitals was clearly explained. According to the official information published by the Taipei City Government, from January 2015 to June 2017, the number of successful referrals was 1018.This bidirectional referral project won the Symbol of National Quality (SNQ) in 2015.

Methods

The bidirectional referral policy between Taipei City Hospital and National Taiwan University Hospital was established in April, 2015.The project entitled with “A retrospective study of bidirectional referral between Taipei City Hospital Zhongxiao campus and emergency department of National Taiwan University Hospital” was approved by Research Ethics Committee of the Taipei City Hospital on May 30, 2018 with the case number TCHIRB-10705105-E. The informed consent of a case study of patient focused medicine was also acquired.

We retrospectively collected data from electric medical and paper records of nineteen patients who received a referral from the emergency room of the National Taiwan University Hospital to Taipei City Hospital Zhongxiao Branch Hospital from January 1st, 2017 to November 30th, 2017. Satisfaction of referral care of the enrolled patients was evaluated with questionnaires. Average hospital stays (days), satisfaction scores and age were reported as means and standard deviations (SD). We randomly selected age and gender- matched patients admitted not due to bidirectional referral during the same period as a control group.

Referral Flow Chart:

The criteria of enrolled patients include the following: 1. Triage classification by NTUH emergency department as Level 3 (urgent) and Level 2(emergent).2. Written informed consent for the transfer. The Case Manager of emergency department of NTUH medical center writes an e-mail to the nurse practitioners of campuses of Taipei City Hospital and prepares the referral discharge summary and radiological images of enrolled patients completed by staff of NTUH medical center and arrange the transfer of the enrolled patients by ambulance straightly into the ward of campuses of Taipei City Hospital. Staff of Taipei City Hospital assists enrolled patients and family for admission at in-patient counter and check-in bed center of campuses of Taipei City Hospital. Nurse practitioners of campuses of Taipei City Hospital record enrolled number, name, gender, applied time, brief description of condition of enrolled patients, required types of bed. A LINE group of attending doctors and nurse practitioners is created (Fig. 1). The bidirectional referral is described as follows: The patients can be transferred from the overcrowding emergency department of National Taiwan University Hospital to the hospital beds of

Taipei City Hospital for continuous, sufficient and timely, high-quality medical care. If necessary, the referred patients can choose to return back to NTUH medical center for treatment. Patient focused medicine with multi-professional practice, shared decision making, quality improvement, and evidence-based medicine is implemented in healthcare of the enrolled patients.

Patient focused care with informed consent of shared decision making, evidence- based care, early discharge planning with multidisciplinary team work

In addition to their disease, patient focused care emphasizes on the management of the needs of patient and family assistance[7], problems and perspectives of patients over time [8], goal-directed shared decision making(SDM) also focuses on comprehensive, continuous care, and coordination of early discharge planning. Goal-directed shared decision making also pays attention to the quality criteria framework of the ethic imperatives for preferences, collaboration and deliberation of patients, religious preferences, preferences of family, and rating of their problems[9, 10], public health benefits[11], the psychosocial outcomes and changed quality of life caused by the disease [12], the duration and the short-term and long-term priority of their problems, implementations of tools(video, computer, booklets, brochure, work book, document)[13] and high level of evidence-based medicine with correct and reasonable medical information[14, 15] and self-care model[16].

Through doctor- patient meetings, three types communication are accomplished: (1) promoting a good relationship between doctors and patients; (2) exchanging information between doctors and patients; and (3) making shared decisions to ensure a high level of quality of healthcare with reduced costs [17, 18].

Early discharge planning services are started close to admission through inter-disciplinary team work conference and doctor-patient meetings. A three-talk model (team talk, option talk, decision talk) should be implemented in SDM with active listening of teams, risk communication between alternative and standard treatment, deliberation, participation and informed consent of patients[19, 20]. The coordinator and supervisor determine complex needs of enrolled patients and use the information system by simultaneously upload on-line to maintain double track operations and improve the quality and efficiency of the discharge planning [21]. It is mandatory to coordinate multi-disciplinary related units (Division of General Psychiatry, Division of Dietetics & Nutrition, Division of Pharmacy, Department of Nursing, Division of Rehabilitation Medicine, Department of Medicine, Division of Community Medicine, Department of Surgery, Community Service Office, Division of social work, and Division of Hospice care) and build patient- focus care staff models [21]. Discharge planning was tailored according to individual cases. The coordinator and supervisor of the discharge planning team are responsible for the audit of clinical treatment plan daily and makes sure of the feasibility of discharge. Post-discharge medical services are arranged and then patients could be discharged with satisfaction.

Questionnaires of patient Satisfaction Rating score 0–10

The bidirectional referral questionnaire comprises 64 items (if Taipei districts are separate out). The item of TSA score of bidirectional referral questionnaires was used in comparison with that of control group. All enrolled patients completed the questionnaires of patient overall satisfaction rating score 0-10[22]. The questionnaires comprise the question as follows: On a scale of 0–10 with 10 being the most positive, how would you describe the overall success of this bidirectional referral between NTUH medical center and Taipei City Hospital, Zhongxiao Branch community hospital?

Patient and public involvement

Patients and patient's representatives were involved in the retrospective cohort study that actively contributed to the research questionnaires. Patients and patient representatives were involved as research partners in the research questionnaires through responding to questionnaires. Patients, patient advisors and patient representatives helped pilot the paper survey for questionnaires. Questionnaires survey consensus process helped patient and patient representatives with technical aspects of completing the paper questionnaires survey, hence improving the response rate in each round of the practice of referral. They also worked with the researchers to collate comments from questionnaires round to adapt items. They checked comprehension of changed items and comments from the lay perspective. The patient advisors took part in the questionnaires if patients and patient representatives cannot reach questionnaires and adapting wording where items were not clear. The patient advisors contributed to edit questionnaires. The authors will disseminate via journal presentations and meetings of medical societies. Hospital superintendent will be encouraged to use referral project.

Statistical analysis

Data were expressed as mean ± standard deviation and number (percentage). Independent t test and Fisher's exact test were performed to analyze patients with ESI = 2 and with ESI = 3.The level of statistical significance was set at 0.05.

Results

During the study period, we received a total of 19 patients from the emergency department of NTUH. Seven patients were categorized as emergent severity index (ESI) triage Level 2, whereas twelve patients were classified as ESI triage Level 3. Mortality rate was 0% and all patients discharged smoothly. Rate of transfer back to NTUH was zero, whereas mortality rate and rate of transfer to other hospitals of the control group were above zero. Because of confidentiality agreement, the exact value of mortality and rate of transfer to other hospitals of the control group must be hidden. Overall, the average satisfaction scores of the study group were 8.89 points (19 questionnaires) with a total score of 11 points, while the average satisfaction score of the control group is 9.40 ± 0.31. The baseline characteristic for enrolled patients was shown on Table 1. The comparison of variables between patients with ESI = 2 and with ESI = 3 was displayed in Table 2. Patients with ESI = 2 were significantly older than patients with ESI = 3. The

diagnosis of enrolled patients was shown on Fig. 2. Cardiac patients were not enrolled, because of emergency diversion can result in delay in treatment for seriously ill cardiac patients [5]. The top three diagnoses of enrolled patients were as follows: First was urinary tract infection; second was pneumonia; third was cellulitis. Distribution of specialist referral for inpatient beds was shown on Fig. 3. The top four specialist referral for inpatient beds were as the following sequence: 1. Division of Gastroenterology; 2. Division of Infectious Disease; 3. Division of Thoracic Medicine 4. Division of General Internal Medicine. The average length of hospital stay is 11.21 ± 8.30 days. The majority of enrolled patients are Taiwanese and living in Taipei. The number of new referral cases(n = 14), defined as never visiting Taipei City Hospital, Zhongxiao Branch, is larger than the number of old cases(n = 5), defined as ever visiting Taipei City Hospital, Zhongxiao Branch.

Table 1
Basic characteristics of the enrolled patients

variables	**values**
N	19
age (years)	52.74 ± 21.75
race	18(94.7)
Taiwanese, n (%)	1(5.3)
Foreigner, n (%)	
gender	10(52.6)
Female, n (%)	9(47.4)
Male, n (%)	
Average length of hospital stays(days)	11.21 ± 8.30
average satisfaction score	8.89 ± 0.81
triage classification	12(63.2)
Level 3, n (%)	7(36.8)
Level 2, n (%)	
Return back to beds of NTUH, n (%)	0(0)
Follow up, n (%)	17(89.5)
Loss follow up, n (%)	2(10.5)
New cases, n (%)	14(73.7)
Old cases, n (%)	5(26.3)
living area	16(84.2)
Taipei, n (%)	3(16.8)
Others, n (%)	
Abbreviation: NTUH, National Taiwan University Hospital	

Table 2
Comparison of variables between patient with ESI = 2 and with ESI = 3.

Variables	ESI = 2(N = 7)	ESI = 3(N = 12)	P value
age	60.71 ± 20.28	44.00 ± 17.99	0.031
Hospitalization days	12.86 ± 9.97	10.25 ± 10.473	0.329
1. new patient group	5(71.4%)	9(75%)	NS
2. old patient group	2(28.6%)	3(10025%)	
1.patients with follow-up	7(100%)	10(83.3%)	-
2.patients with loss of follow-up	0(0%)	2(16.7%)	
1.Female	4(57.1%)	6(50%)	NS
2.male	3(42.9%)	6(50%)	
1, patients living in Taipei places of residence	7(100%)	9(75%)	-
2. patients not living in Taipei places of residence	0(0%)	3(25%)	
TSAT of bidirectional referral	8.43 ± 0.535	9.17 ± 0.835	0.059
Abbreviations: ESI, emergency severity index; TSAT, total satisfaction score: NS, not significant			

A Case Study of high-quality patient-focused medicine:

A 70-year-old male vagrant had traumatic injuries in the right ankle and the left upper limb due to a falling accident which later became necrotizing fasciitis of right ankle and abscess of the left upper limb. Initial vital signs were as follows: respiratory rate, 20/minute; heart rate, 118/minute; blood pressure, 109/78 mmHg; oxygen saturation, 98%. The Glasgow Coma Scale was 15/15. After fluid therapy with dextrose saline and empiric intravenous antibiotics, he was transferred on August 14, 2017 from NTUH medical center with initial white blood cell count as high as 18100/mm^3, serum creatinine level as 0.9 mg/dL and blood urea nitrogen level as 18.4 mg/ dL. Altered mental status and pus drained from right ankle were noted in the ward. Because of some later signs and symptoms of necrotizing fasciitis in this elderly patient without family and identification card, doctor-patient conference and interdisciplinary conference were held immediately for informed shared decision making, interdisciplinary practice, and early discharge support. Informed consent of shared decision making with evidence- based medicine was obtained during the doctor- patient meeting.

Wound care and antibiotic were prescribed for coverage of streptococcus pyogenes which was cultured from the wounds. He received emergent debridement and fasciotomy, and then skin grafting, respectively. Far infrared therapy was used for wound healing. Multi-professional practices include appropriate dietary adjustments, early discharge planning, daily activity care from ward assistants, and team work of infection specialist, psychiatrist, rehabilitation specialist, and social workers. Staffs of

divisions of social work applied identification card for the patient. Afterwards, he got improvement and he can stand and walk briefly. The patients' wounds healed well after skin grafting and he discharged on 106/09/01. Social workers assist him residing in nursing homes for long term care. This patient then was referred to another social worker from the Social Bureau of New Taipei City. Finally, this single case may represent the overall target of the bi-directional referral project.

Discussion

The main significant findings of this study were as follows: Patients with more severe emergent index (ESI = 2) were significantly older than patients with less severe emergent index (ESI = 3), but there was no significant difference of TSAT of bidirectional referrals between these two groups. However, the former finding, namely patients with more severe emergent index (ESI = 2) were significantly older than patients with less severe emergent index (ESI = 3), was not all the same out-side the study period. Mortality rate was 0% and all patients discharged smoothly. Rate of transfer back to NTUH was zero. The average satisfaction score of the study group was 8.89 points (19 questionnaires) with a total score of 11 points (0–10), which was more than 8 points and comparable to the control group. The top one diagnosis of enrolled patients was urinary tract infection. Infected patients represented majority of transferred patients. The proportion of new cases is 14 patients out of 19 patients (73.7%).

The rate of acceptance of post-discharge follow- up appointment is 89.5%.

Some patients have the prejudice that there are better health services in large hospitals than in small hospitals. As a result, the emergency department of medical center is overcrowded, and then the quality of medical services for patients may be greatly reduced. The average satisfaction score of the control group (9.40 ± 0.31) was better than that (8.89 ± 0.81) of our study group suggested that some patients want to stay in National Taiwan University Hospital medical center. However, the data of 0% mortality rate and 0% return back rate, compared to the data of patients admitted not due to bidirectional referral in the same period, suggest that these enrolled patients can be well handled at community hospital. No wonder why the rate of backward transferring to NTUH is zero, although medical centers usually get highest trust. The patients can make their own decisions freely and they had choices to stay or transfer back to NTUH. The absence of backward transfer might, as the authors inferred, be a positive indicator of patient satisfaction, not likely to be a clue of a dysfunction in backward transfer access to the NTUH.

The majority of patients (89.5%) were willing to follow up at the clinics after discharge, which indicated not only high rate of acceptance of post-discharge follow-up appointments but also trust and satisfaction of health care of Zhongxiao campus. The larger proportion (73.7%) of new referral cases than the proportion (26.3%) of old cases suggests that the added value of profit of this project. Early admission of geriatric patients with short length of stay in emergency department suggested by previous researches demonstrated good clinical and financial outcomes of health care for geriatric patient[23, 24].

The ESI (emergent severity index) triage Level 1 patients are the patients requiring the highest acute care. These patients are clinically unstable and should not be transferred. These patients need doctors and nurses to provide critical care and life-saving measures. We suggest proper management of triage Level 2 patients before transfer. There was no mortality in these enrolled patients because of high quality healthcare in Taipei City Hospital, Zhongxiao Branch community hospital and emergency department of NTUH. Although patients with ESI = 2 were significantly older than patients with ESI = 3, there were no significant difference of TSAT of bidirectional referrals between these two groups.

Infected patients represented the majority of this retrospective cohort of transferred participants. Necrotizing fasciitis is a plastic emergency that may result in high mortality and amputation if debridement is too late. Vagrants are disadvantaged population with no support systems of family, and weak self-care capabilities. Evidence based medicine of treatment protocols of necrotizing fasciitis including aggressive resuscitation, rapid administration of antibiotics and immediate surgical debridement and fasciotomy are recommended for all patients [25]. Late signs and symptoms of necrotizing fasciitis represent skin necrosis, muscle gangrene, foul discharge from the wound, and multiple organ dysfunctions. This elderly vagrant presented some late signs of necrotizing fasciitis and received immediate surgical intervention and patient- focused care. Cognitive defects in this homeless patient may have an impact on the rehabilitation program and skill training [26].

Through the bidirectional referral project, the provision of good, continuous, timely, patient- focused care for the enrolled patients fully highlights the core value of Taipei City Hospital and also confirms that the referral program is safe. This project has reduced the strain of the patients and made the hospital beds of medical centers and community hospitals more flexible. Review and analysis of the results can be used to improve the quality of patient care. Therefore, this bidirectional referral flow chart can be a prototype of referral project of hierarchical arrangement between medical centers and community hospitals. In the future, we will extend this project to other nearby medical centers and establish community hospitals and nearby medical centers cooperation networks.

Conclusion

Our study establishes successful patient- centered implementation of referral processes to improve patient satisfaction and care coordination with not only standardized and correct document and electronic format which that communicates key information of the bidirectional referral process to ensure the correct communication to avoid duplicate or delayed tests and examinations, but also with the use of excel spreadsheet to track the referral process and identify wrong communications. The open question (item 46 and item 52) of our questionnaires provided participation of patients in suggestions of the bidirectional referral process which is mirrored by a previous study[27].

Patients can be transferred from the Emergent department (ED) of the medical center to the wards in a community hospital via a fast tract. Based on the mortality rate, backward transfer rate and satisfaction score, the authors made a conclusion that this program is desirable for the patients regarding the safety

and quality of clinical services. This bi-directional referral system, on a regional basis, is a potentially feasible model to be followed.

Abbreviations

ED: Emergency department; NTUH: National Taiwan University Hospital; SD: standard deviations; SNQ: Symbol of National Quality; TCHIRB: Institutional Review Board of Taipei City Hospital; ESI: Emergent severity index; TSAT, total satisfaction scores

Declarations

Authors' Contribution

KMJ and WJY implemented the design and concept of study; W.J.Y wrote the main manuscript text; WJY analyzed the data; W.J.Y. prepared figures and Tables; L.W.C. assisted completion of Figure 1. All authors reviewed the manuscript.

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Ethics Declaration

The Taipei City Hospital Research Ethics Committee approved the study with the case number TCHIRB-10705105-E. Our research was conducted in accordance with a norm or standard according to the Declaration of Helsinki.

Limitation

The study population was restricted, and the sample size was narrow due to small needs of diversion from the emergency department of National Taiwan University Hospital.

Competing Interests

The author(s) declare no competing interests.

Funding

The author(s) received a specific funding from Institutional Review Board of the Taipei City Hospital for this project.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request and under the permission of Taipei City Hospital Research Ethics Committee.

Ethics approval and consent to participate

This study was approved by Institutional Review Board of the Taipei City Hospital on May 30, 2018 with the case number TCHIRB-10705105-E. All participants signed the written consent form.

Consent for publication

This section is not applicable because the personal or clinical details of participants presented does not compromise anonymity.

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Figures

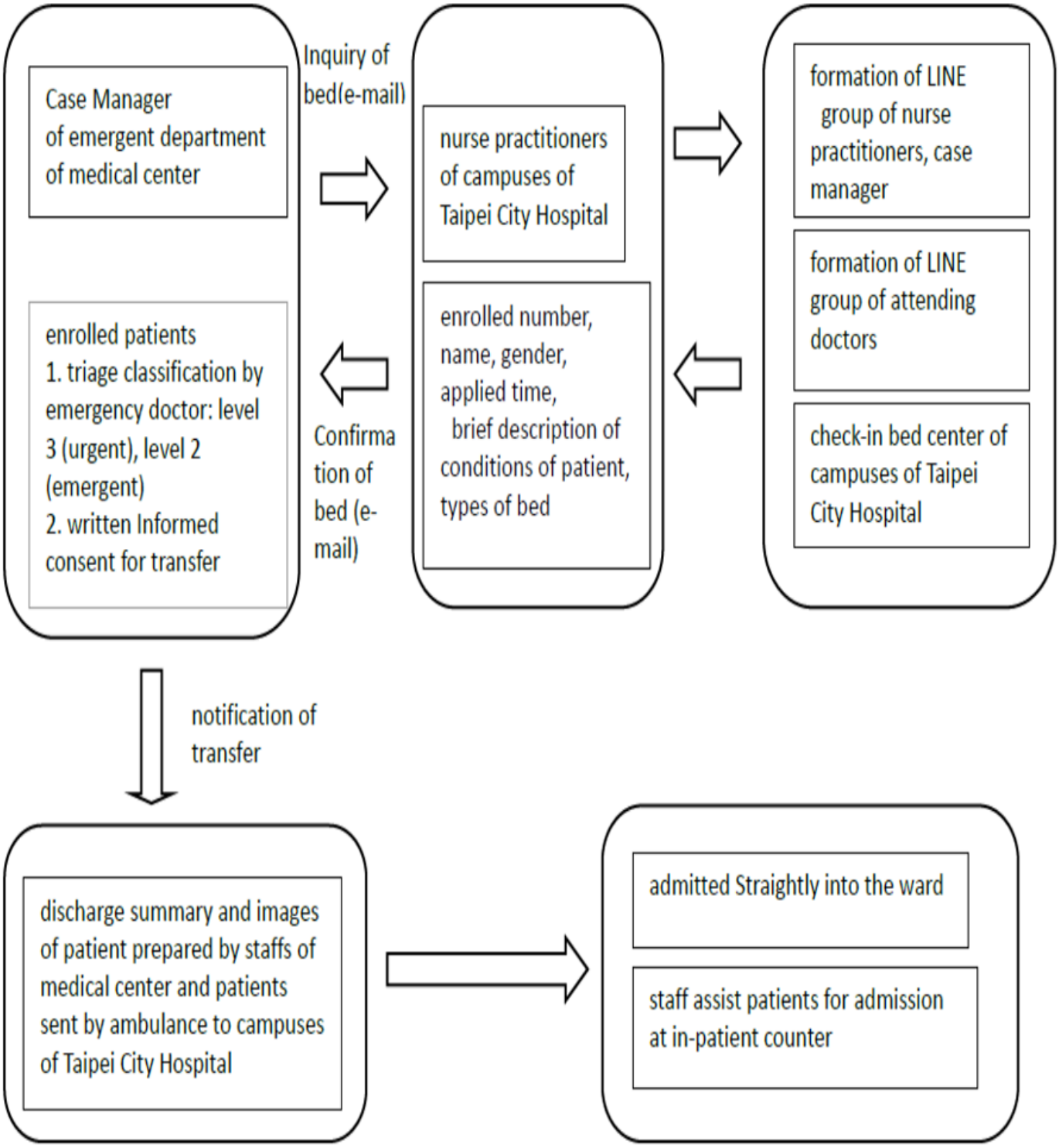


Figure 1

Flow chart of bi-directional referral project between medical center and community hospital

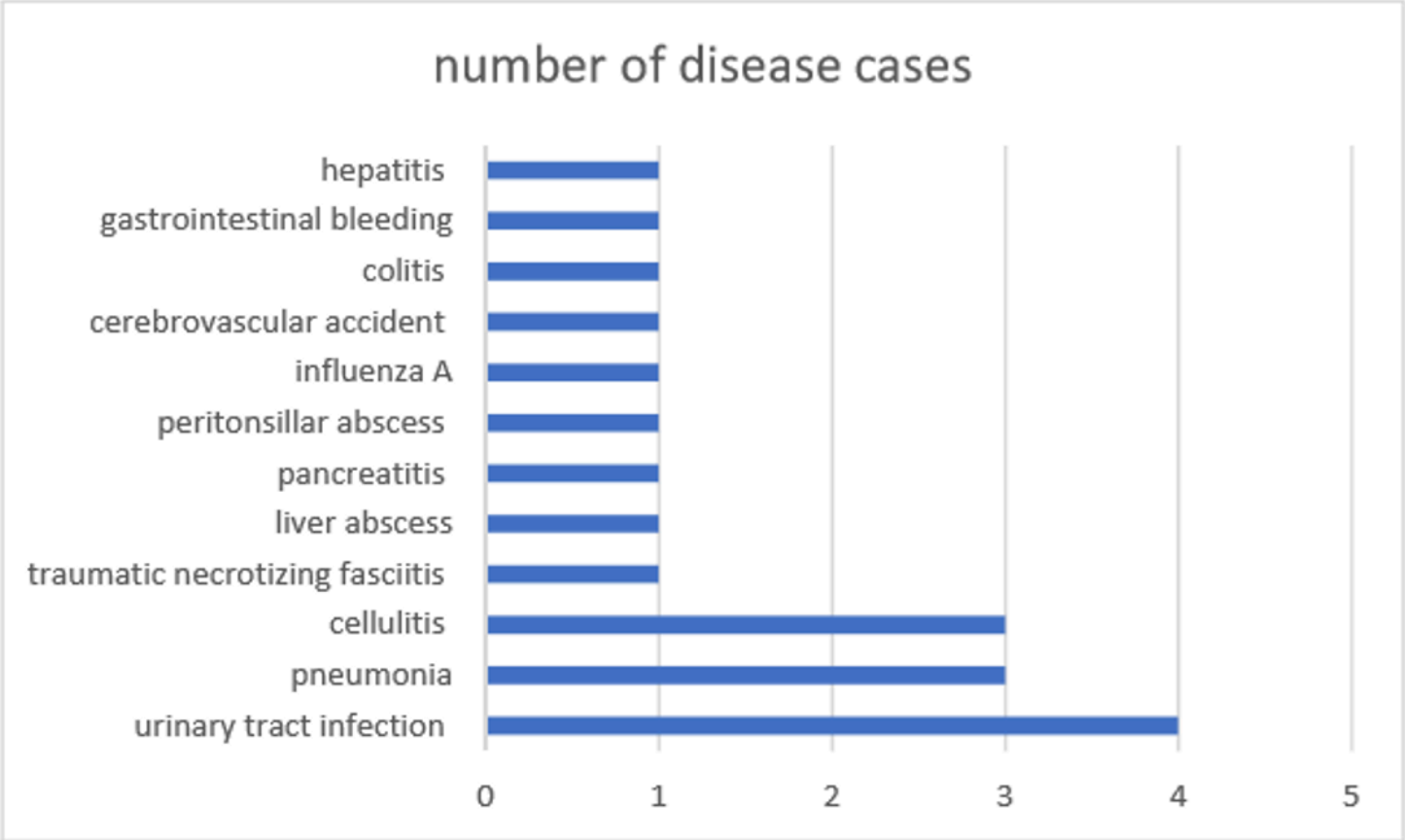


Figure 2

Diagnosis and case number of enrolled patients

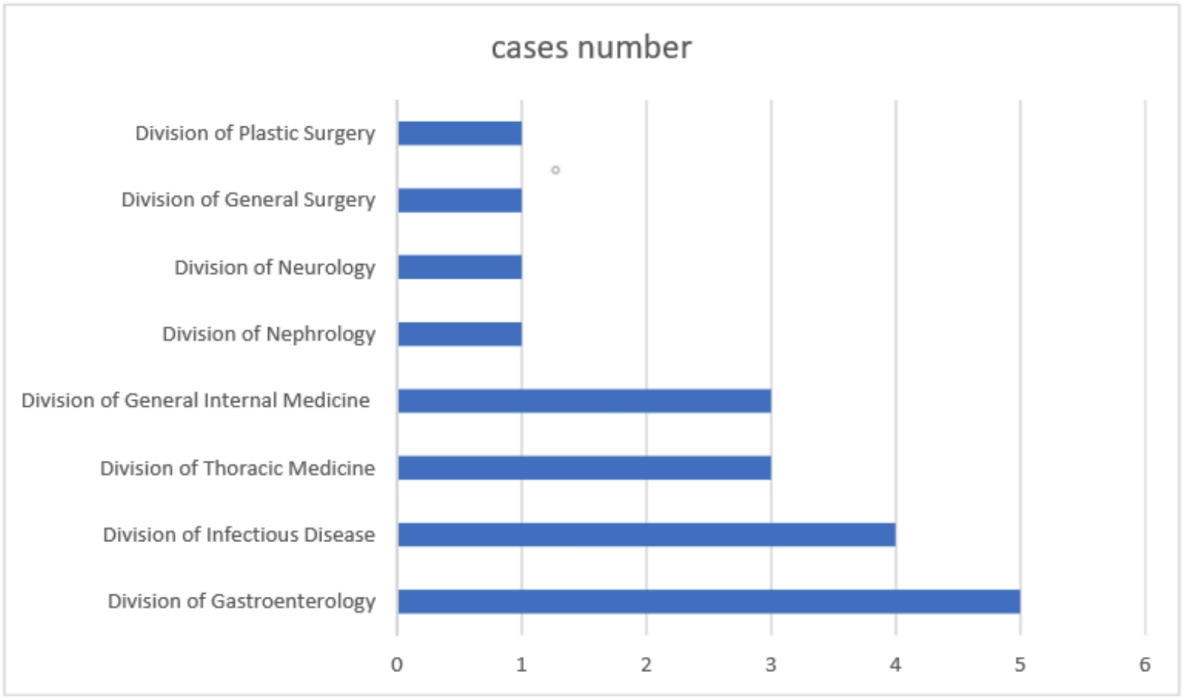


Figure 3

Distribution of division referral