International Journal of Advanced Research and Development
ISSN: 2455-4030; Impact Factor: RJIF 5.24
Received: 12-12-2020; Accepted: 26-12-2020; Published: 21-01-2021
www.advancedjournal.com
Volume 6; Issue 1; 2021; Page No. 09-15

Factors affecting in-patient component of national injury surveillance at a base hospital in Sri Lanka

Perera U AAS[1], Wikramasinghe SC[2], Jayakody J AP[1], Wijesooriya WARP[3]
[1] MBBS. DIPPCA, MSc, MD in Medical Administration, Senior Registrar in Medical Administration, Ministry of Health, Sri Lanka
[2] Consultant Community Physician MBBS. DIPPCA, MSc, MD in Community Medicine, Deputy Director General–Non communicable Disease, Ministry of Health, Sri Lanka
[3] BSc (Honors') Biomedical Science, Student, Nothumbria University, Sri Lanka

Abstract
National Injury Surveillance System which was initiated in Base and above Hospitals is one of the main strategies identified in the national policy and strategic framework on injury prevention in Sri Lanka. However, the overall coverage of In-Patient component of National Injury surveillance (ICNIS) in these hospitals was 14 %. Hence, this study was aimed at identifying factors affecting ICNIS in Base Hospital Karawanella. The study was carried out by mapping the existing process, Focus Group Discussions and Key Informant Interviews with relevant staff and desk review of randomly selected 184 Bed Head Tickets (BHT) with Injury Surveillance Forms (ISF) of patients discharged during five months in 2019.
The study revealed that coverage of capturing of patients in ICNIS was 7.2% and timeliness of data entry to the system (within 30 days of patient discharge) is 11%. Completeness and Accuracy of most of the captured data in ISF are above 80%. Lack of capacity building, unavailability of access to hospital data in the system, poor feedback mechanism, disagreement of staff on issuing and filling ISF and poor monitoring mechanism are the other factors identified. Streamlining of the process of ICNIS by issuing and filing ISF at multiple entry points, amending the current circular and guide enabling Nursing Officers to fill ISF under the guidance of MO, simplifying ISF, arranging periodic in-service training and providing uninterrupted access to EIMMR system with an analytical module at all hospitals.

Keywords: injury surveillance, base hospital karawanella, injury surveillance form

Introduction

Background

The Disease surveillance is the ongoing systematic collection and analysis of data to provide information on a country's disease burden, population groups at risk, estimates of mortality, morbidity, risk factors and determinants as well as the response of national systems (World Health Organization, 2011) [19].
Injuries are one of the leading causes of hospitalization, death and disability throughout the world. Globally around 9% of all deaths and 16% of the burden of disability are caused by injuries annually (Ministry of Health, 2016) [11, 12]. Injuries represent a significant and growing public health concern in the South-East Asian Region (World Health Organization, 2006). Injuries have been the number one cause of hospitalization for the last two decades in Sri Lanka. Injuries related to domestic and road traffic accidents falls, sports and occupational injuries are some of the leading causes of morbidity among the indoor admissions of state sector hospitals in Sri Lanka (Ministry of Health, 2016) [11, 12].
Effective injury prevention and management strategies are built upon a clear understanding of the extent of injuries. 'Quality and timely data' are required to evaluate the evolving success and cost-effectiveness of strategies for injury prevention and management. Hence, injury surveillance lays the foundation for injury control initiatives (Ministry of Health, 2016) [11, 12].

Justification

National Injury Surveillance system was introduced to Base Hospitals, District and Provincial General Hospitals and Teaching hospitals in 2016 since the routine Indoor Morbidity and Mortality Return (IMMR) did not provide the essential information required for injury prevention and management (Ministry of Health, 2016) [11, 12]. The surveillance system consists of three components: outpatients, inpatients and reporting of death related to injuries. Injury Surveillance Form (ISF) has been introduced with ten major criteria to be filled by Medical Officers. Medical Record Officers (MRO) have been given the facility to enter the captured data in the existing Electronic Indoor Morbidity and Mortality Register (EIMMR). However, the overall coverage of Inpatient Component of National Injury Surveillance (ICNIS) in these hospitals was less than 14% (Ministry of Health, 2017) [10].
National Injury Surveillance (NIS) has been initiated in all four major hospitals in the district of Kegalle. However, the total coverage of ICNIS of these hospitals was even below the national coverage (less than 10%). Furthermore, the completeness of some captured data was less than 50% (Ministry of Health, 2017) [13].
The preliminary observation and experience of the principal investigator (PI) as a medical administrator in the same Regional Directorate of Health Services (RDHS) revealed that BHK operates injury surveillance with minimal resources. Assessment of current system and identification

of its affecting factors are essential to formulate strategies on the improvement of injury surveillance in a low resource setting and it will be helpful for the entire system to achieve the objective of initiated NIS.

Statement of the problem

Coverage of injury surveillance of inward patients in BHK was less than 10 % in 2018. However, proper evaluation is yet to be carried out to identify factors affecting its performance. (RDHS, 2018).

Objectives

General objective

To Factors affecting in-patient component of National Injury Surveillance at a Base Hospital in Sri Lanka

Literature Review

Injury Surveillance

Attributes of a good injury surveillance system are simplicity, flexibility, acceptability, reliability, utility, coverage, sustainability and timeliness (WHO, 2001). A retrospective review of Canadian electronic hospital injury surveillance programme revealed that the system has largely met simplicity, flexibility and acceptability but failed to meet the latter. (Stone *et al*, 2012) [16]. A study conducted in Russia using the Shenkursk Injury Registry data to assess the level of surveillance revealed that the coverage of capturing cases was 86% (Ungurean *et al*, 2019).

Lakshmi *et al*, 2016 carried out a pilot study in a district hospital in India that showed a sustainable routine injury surveillance system (ISS) is essential to formulate effective intervention policies. Typically, the methods available to monitor injuries are quite diverse. Identifying priority areas for standard development is useful to improve the ISS (Mitchell *et al*, 2008; Fizharris *et al*, 2011 and Auer *et al*, 2011) [8, 1]

A study carried out by Anna *et al*, 2011 revealed that the WHO guidelines provide a basic platform for evaluation. Further, Rebecca *et al*, 2009 developed an evaluation framework for ISS based on three areas namely data quality, system operation and practicality.

Many previous studies have mainly focused on the epidemiological aspect of injury surveillance while few have addressed the challenges and facilitators of the systems. However, Azadi *et al*, 2019 [2] identified that management barriers, weakness in data capture and usage and resource limitation hinder ISS in Iran.

World Health Organization evaluated ISS of states of the Asia-Pacific Region in 2012. China, Australia and Thailand found to have well-structured ISS with good coverage of injury surveillance. Many countries implement quality control measures even with inbuilt systems in the software of ISS. Bangladesh has established a central level monitoring body for quality control of data. Further WHO has found that most of the countries conduct refresher training and periodic evaluations. Thailand was found to possess an effective ISS in which nursing officers are responsible for filing the ISF.

WHO, 2012, Ruth *et al*, 2016 [14], Leanne *et al*, 2016 [7] emphasized that any surveillance system should provide the facility for data analysis and strengthening of the linkage from data to action at each level.

National Injury Surveillance System in Sri Lanka

Samarak kody y *et al*, 2012 stated that the Pilot ISS in Sri Lanka does not operate efficiently and not comply with WHO guidelines. Hence, he emphasized the development of ISS based on WHO guidelines. Ministry of Health formulated the policy and strategic framework on injury prevention and initiated an ISS in 2016. One of the strategic objectives of the policy is to strengthen the injury information system. The Initial phase of NIS includes establishing ISS with feedback mechanism (Ministry of Health, 2016) [11, 12]. The circular and Guide on NIS issued in 2016 describing responsibility and the flow of information highlighted that ISF (H-1258) should be filled by MO and ISF to be kept at each entry point.

Methods

Study design

This is a descriptive cross-sectional study consisted of qualitative and quantitative components.

Study setting

The study was carried out at BH Karawanella which is a type B Base Hospital which consists of 362 beds with two units for all four major specialities. The injury surveillance system was introduced to BHK in 2016.

Study period

The study was carried out during the period of 1st of July2019 to 7th April 2020

Data collection methods and study instruments

Process mapping.

The process needed to map was identified by observation and inputs of all the relevant staff of ICNIS. All the gathered information was organized as steps in sequential order of the process. Process mapping was done using swimlane lucid chart software.

Qualitative Interviews

Focus Group Discussions (FGD)

FGDs were conducted to identify the gaps in ICNIS with mixed groups consisted of four Medical Officers (MOs) and four Nursing Officers (NOs) at surgical units of BHK. Two rounds were performed using FGD Guide which consisted of a series of open-ended and sample probing questions. Facilitation was done by PI.

Key Informant Interviews (KII)

Eight KIIs were conducted by PI using adjusted KIIs which consisted of open-ended questions based on literature and guidelines on NIS.FGD and KII guides were developed in English, translated to Sinhala and pilot-tested with former medical officers and a medical administrator.

Desk reviews of secondary data (quantitative component)

Desk review of Bed Head Tickets (BHT) and Injury Surveillance Forms (ISF) of patients with injuries discharged within the first five months of 2019 which had been entered into injury surveillance system was carried out. Checklist of Injury Surveillance Performance (CLISP) was developed by PI based on ISF, WHO guidelines on injury surveillance which was used to extract data from BHTs and ISFs concerning coverage, completeness, accuracy and

timeliness of ICNIS. It was pretested in different settings and edited where necessary. CLISP includes general data such as a ward, BHT number, data related to timeliness such as date of discharge and date of data entry into the system. Also, completeness and accuracy of data in ISF such as the mechanism of injury, place of occurrence, activity, intent, affected body region, type of injury, evidence of alcohol were checked.

Study participants

FGD: Medical Officers and Nursing Officers

KII: Regional Director of Health Services, Medical Officer NCD, Medical Superintendent of BHK, Consultant Surgeon, Medical Officer in charge of OPD, Matron, Medical Record Officer and Consultant Community Physician of national focal point on injury surveillance.

Inclusion criteria

FGD

Members with at least three-month experience in the current post and unit

KIIs

Members with at least six-month experience in the current post and unit

Sample size and sampling technique

Four medical officers and four nursing officers for each round of FGD and eight key informants for KII were purposively selected based on their importance and involvement in ICNIS.

Selection of BHT with ISF to assess the timeliness, completeness and accuracy of ICNIS

The sample size was determined using the following formula.

$n= Z^2P (1-P)/d^2$ (Lwanga and Lemeshow 1991).

n = desired sample size

z = standard normal deviation (set at 1.96 which corresponds to 95% confidence limits)

d = degree of accuracy desired (set at 0.05)

P = Anticipated population proportion =Anticipated Percentage of BHT having ISF is 14% (MoH, 2017) [13]

$n= (1.96)^2 \times 0.14 \times 0.86/ (0.05)^2$

n=184

Sample size

Total number of184 BHTs with ISFs was selected using a simple random sampling method.

Data collection

Process of ICNIS was identified with observation and inputs provided by the relevant staff. It was augmented by qualitative interviews. The process was organized in sequential order with steps and compared with given guidelines to identify areas for improvement.

FGD was carried out at surgical units with the prior consent of participants. Each session was conducted in Sinhala, with a moderator. Facilitation was done by PI. Some were audio-recorded with permission and all were supplemented with notes. Questions were asked from the participants about the current process of ICNIS, their role, perception on timeliness, issuing and filing of ISF, support of other involved parties, barriers, experience, opinion on improvement and factors affecting each step of the process. KIIs were carried out after obtaining a prior appointment at their convenience to obtain elaborative information on the above areas and data related to qualitative indicators in Result framework. Data were collected by PI.

BHT and ISF of patients with injuries and entered to the system were selected from the record room with the support of MRO for pre-intervention assessment. Desk review was done in July 2019 allowing time gap to receive BHT to MRO. CLISP was used to extract data from each selected BHT and ISF by PI himself.

Definition of variables

Table 1: Definition of variables/indicators of the study

Variable	definition
Coverage	Capturing patients with injuries by ICNIS Number of injury patient captured in NIS (filling ISF) Total Number of the patients with injuries reported
Completeness	Filling of item/component in ISF**.** Each item is considered separately. and will be presented as % % of ISF with item filled = % completeness
Accuracy	Completed ISF with item correctly indicated as per BHT. this will be presented as % of ISF with the item correctly indicated
Timeliness	ISF entered within 30 days of discharge from the ward (Timeliness was assessed considering the period from the date of discharge of the patient to date of ISF data entry to the system.)

Table 2: variables and means of data collection of the study

Outcome Indicators of the project	Means of gathering data
% Coverage of ICNIS % of patients with injuries captured by surveillance	Checklist
% Completeness % of ISF with the completeness of each item % Accuracy % of ISF data item accurately indicated as per the BHT	Checklist Checklist
Timeliness; % of ISF entered on time to the surveillance system The average time is taken to enter data to the system since discharge from the ward	Checklist

Data analysis

In the qualitative component, the Content analysis was used to analysis of data. Secondary data were analyzed in the percentage of coverage, timeliness, completeness and accuracy of ICNIS.

Ethical issue and clearance

Approval was obtained from Provincial Director of Health Service Sabaragamuwa Province and RDHS Kegalle. There was no conflict of interest or ethical issues.

Results

Qualitative and quantitative assessment of ICNIS was carried out using the following methods.

Process mapping

The process of ICNIS was mapped and the identified gaps of each sub-stage were illustrated (Figure 2).

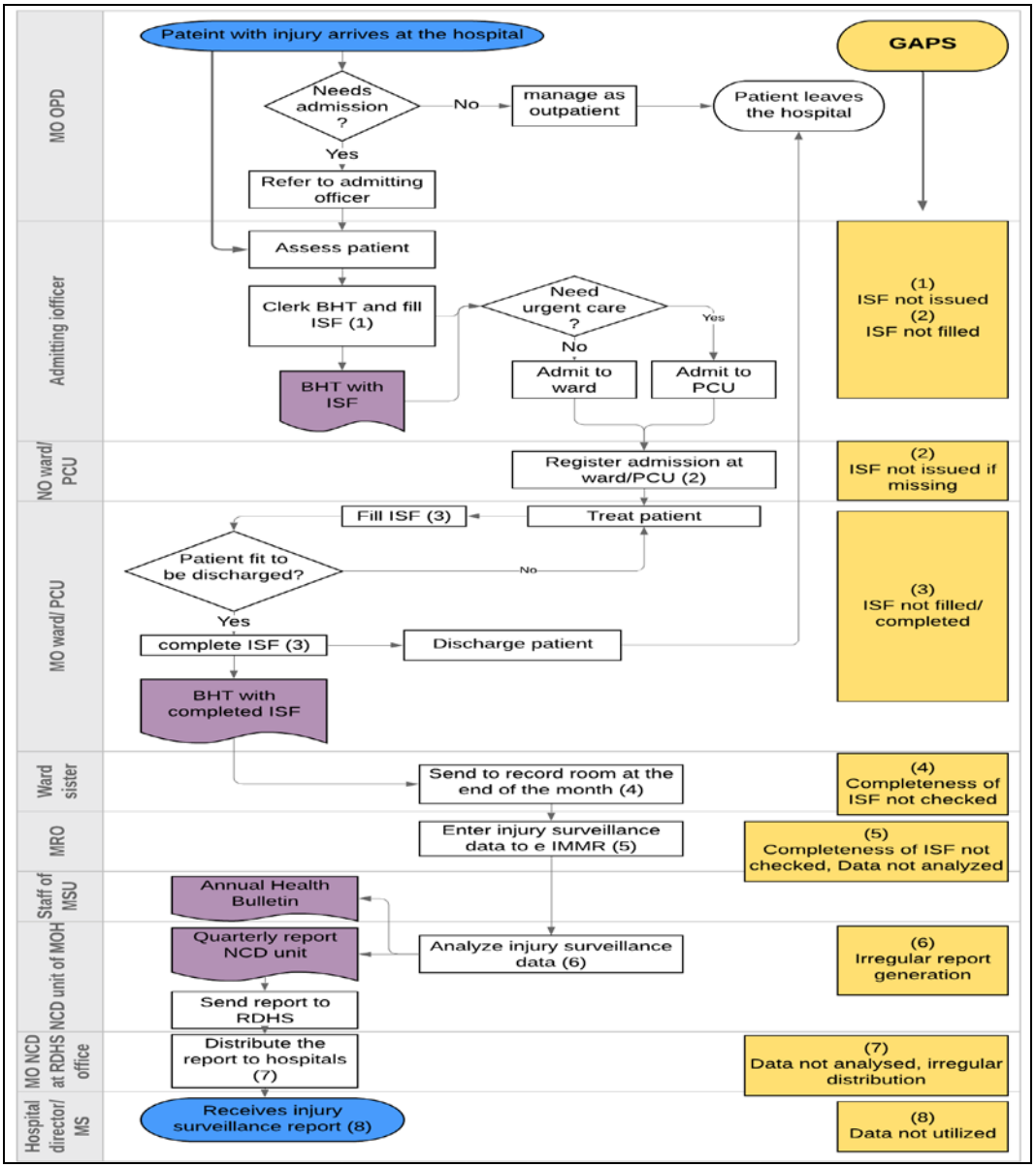

Fig 1: Process Map of ICNIS at BHK with identified gaps

Qualitative assessment of ICNIS at BHK

The qualitative assessment is based on the FGD and KII and Process mapping of ICNIS.

In addition to the illustration of process mapping, the description of identified gaps is depicted in table 03.

Table 3: Description of gaps Concerning the process of ICNIS

Gap/response	Respondent
1. No in-service training and capacity building mechanism for relevant staff	All
2. Issuing of ISF for patients with injuries is confined to the Admitting Officer which is not issued regularly for patients with injuries	majority
3. Filling of the ISF by Medical Officers does not happen regularly and adequately	MRO/MS/Matron/NO
4. Completeness of ISF is not checked at any point of the process	Majority
5. Delay in data entry to e IMMR system	MS/CCP focal point
6. No provision in the system (e IMMR) to retrieve or analyze data entered by the hospital	MS/MRO/
7. No mechanism in ICNIS for coordination and monitoring	MS/Matron
8. Poor involvement of consultants and unit heads on supervision	MS
9. Poor feedback mechanism from ministry level to unit level in the BHK	Majority
10. No utilization of data at the hospital level for any purpose	MS/Consultant

As shown in table 3, it is revealed that only the Admitting Officer issues ISF limiting its availability. Neither ISF is issued regularly, nor is any component of it filled by the Admitting officer (gap 2). One of the most important bottlenecks identified is the unavailability of facilities to access the hospital data fed to the existing system which leads to difficulties in generating reports or use of any data at the hospital level. It is evident that MOs are reluctant to fill the ISF due to lack of training and too many details to be filled. Consultants are not involved in supervising injury

surveillance at respective units. It is further revealed that BHK does not possess any feedback mechanism on the performance of ICNIS (gap.9).

Quantitative assessment

Patient coverage, accuracy, completeness and timeliness of ICNIS were assessed.

Coverage of ICNIS

Table 4: Percentage of Patients with Injuries Captured Through ICNIS January to May -2019

Coverage of ICNIS				
Month		No. of inward patients with injuries	No. of Patients captured by surveillance (ISF filled)	Percentage/ coverage
1	Jan-19	615	44	7.1%
2	Feb-19	649	48	7.4%
3	Mar-19	487	33	6.7%
4	Apr-19	516	46	8.9%
5	May-19	585	35	5.9%
	Total	2852	206	7.2%

Coverage of capturing patients with injuries through ICNIS in the first five months in 2019 (pre-intervention) is only 7.2% (table 4)

A. Timeliness of ICNIS

Table 5: Timeliness of data entry of ICNIS

Timeliness of ICNIS		
Period (days)	No. of Entries	Percentage
≤ 30	20	11%
> 30	164	89%
Total	184	100%

Only 11% of data related to patients with injuries (ISF) were entered within 30 days of patient discharge.

B. Completeness of ICNIS

Completeness of items of ISF filled by MOs was reviewed. Results of completeness are presented in Table 7

C. Accuracy of ICNIS

Accuracy of completed data in ISF compared to information in BHT was reviewed results are presented table 8.Accuracy of the data item in ISFs varied from 63.2 to 100%

Table 6: Distribution of completeness of items of ISF

Distribution of completeness of items in ISF						
Sub Item	ISF Completed		ISF not Completed		Total	
	No.	%	No.	%		
Date of Injury	175	95.1%	9	4.9%	184	100%
Time of injury	114	62.0%	70	38.0%	184	100%
Age	136	73.9%	48	26.1%	184	100%
Sex	136	73.9%	48	26.1%	184	100%
MOH Division	46	25.0%	138	75.0%	184	100%
Mechanism of injury	180	97.8%	4	2.2%	184	100%
Place of occurrence of injury	162	88.0%	22	12.0%	184	100%
Activity done at the time of injury	162	88.0%	22	12.0%	184	100%
Intent (intentional or not)	171	92.9%	13	7.1%	184	100%
Affected body region	171	92.9%	13	7.1%	184	100%
Nature of injury	156	84.8%	28	15.2%	184	100%
Evidence of alcohol use	180	97.8%	4	2.2%	184	100%
Disability at the time of discharge	173	94.0%	11	6.0%	184	100%
Evidence of substance use	164	89.1%	20	10.9%	184	100%
Patients outcome	158	85.9%	26	14.1%	184	100%
Tertiary care given	147	79.9%	37	20.1%	184	100%

Pre-intervention percentage of completeness of items in ISF varied in a wide range from 25 % (MOH area) to 98% (Mechanism of injury).

Table 7: Distribution of Accuracy of completed data in ISF

Item in ISF	Accuracy of ICNIS					
	Accurate		Not Accurate		Total	
	No	%	No	%		
Date of Injury	148	84.8%	27	15.2%	175	100%
Time of injury	79	73.1%	29	26.9%	108	100%
Age	130	95.2%	6	4.8%	136	100%
Sex	136	100.0%	0	0.0%	136	100%
Mechanism of injury	148	84.9%	26	15.1%	175	100%
Place of occurrence of injury	121	76.2%	38	23.8%	158	100%
Activity done at the time of injury	100	63.2%	58	36.8%	158	100%
Intent	171	100.0%	0	0.0%	171	100%
Affected body region	168	97.7%	4	2.3%	171	100%
Nature of injury	140	90.0%	16	10.0%	156	100%
Evidence of alcohol use	139	88.1%	19	11.9%	158	100%
Evidence of substance use	123	80.2%	30	19.8%	153	100%
Disability at the time of discharge	143	95.3%	7	4.7%	150	100%
Patients outcome	137	91.7%	12	8.3%	150	100%
Tertiary care	147	100.0%	0	0.0%	147	100%

*BHT and ISF with no data for particular items were excluded from the analysis.

"MOH Division" was excluded from the analysis as it was not mentioned in any BHT

Discussion

The effective injury surveillance system, a key strategy for injury prevention endorsed by WHO as well as the national injury prevention and management framework, is invariably linked to parameters such as good coverage, accuracy and timeliness (WHO, 2001, MOH, 2016) [11]. Lakshmi *et al*, 2016 [6] carried out a pilot study in a district hospital in India that showed that a sustainable routine injury surveillance system (ISS) is essential to formulate effective intervention policies. In this background, the present project intended to assess the above parameters of the Inpatient component of national injury surveillance (ICNIS) at BHK.

The existing process was assessed both qualitatively and quantitatively and mapped to identify the deficiencies in the process. Lack of issuing and completion of ISF, delay in entering data to the-IMMR and absence of feedback mechanisms and facilities to analyze data at an institutional level were identified as deficiencies in the existing process. Similar barriers were identified in Iran (Azadi *et al* 2019) [2] even though many guidelines indicated that monitoring and feedback mechanism and institutional capacity development are fundamentals of ISS (WHO, 2001, 2012).

Desk review of secondary data adopted in the current project has widely been practised in many similar studies (Hon *et al*, 2019).The study revealed that coverage of patients with injury and timeliness of ICNIS were unsatisfactory. Coverage of ICNIS was as low as 7.2% (n =184) in contrast to that of 86% in Shenkursk, Russia (Unguryanu *et al*, 2019) [17]. It is emphasized that coverage of an ISS needs to be over 80% for effective decision making (WHO, 2001). Series of previous studies have shown that injury surveillance information systems can be beneficial through providing timely and accurate data (Azadi *et al*, 2019; Fizharris *et al*, 2011) [2]. Timeliness of ICNIS was suboptimal with 11% (n=20) of the entries made within30 days of discharge of the patient. This contrasts with China, Australia and Thailand where the timelines of ISS are declared to be satisfactory (WHO, 2012). However, even some developed countries such as Canada have failed to achieve the timeliness of ISS (Stone *et al*, 2012) [16].

Out of 16 items in ISF, MOH division (25%), Nature of injury (62%) and Age (74 %) were the lowest reported completeness respectively. Accuracy with BHT data varied from 63.2 to 100%.The lowest percentages reported were Activity done at the injury (63.2%) and Time of injury (73.1%).

Qualitative interviews revealed that lack of awareness, skills and interest of the staff, poor supervision and resource constraints contributed to unsatisfactory performance of ICNIS (table 5).In contexts such as Myanmar and Cambodia, similar causes resulted in poor coverage and performance of ISS (WHO, 2012). Following WHO guideline on injury surveillance 2001, awareness and knowledge of the staff on importance and process of ICNIS while providing adequate facilities such as uninterrupted internet facility and clear assignment of responsibilities for each staff category are important factors.

KII revealed that only the Admitting Officer issues ISF limiting it to a single-entry point. The current project intervened to make the ISF available and issued at multiple entry points such as PCU and wards as per the guideline on national ISS (MOH, 2016) [11].

WHO 2012, Ruth *et al*, 2016 [14] emphasized that any ISS should facilitate data analysis and utilization at each level in local planning which enhances motivation and ownership of the system. Leanne *et al*, 2016 [7] has also indicated a strengthening of the linkage from data to action at each level. Quite contrastively, the current study revealed that national ISS has no facilities to access the data at hospital or RDHS level which hinders the use of any data at hospital leading to the absence of data analysis and reporting feedback to relevant wards.

WHO stepwise process to surveillance (2012) emphasized that only a few important data must be included in routine surveillance to ensure the quality of data but current ISF was revealed to be lengthy with too many details. Conflicts were identified between MOs and NOs regarding the assignment of responsibilities in filling ISF. In Thailand, where an efficient ISS exists, all the components except diagnosis are filled by NOs. Turnover of intern MOs every six months was also a challenge in retaining skills in ICNIS which warranted periodic refresher training to ensure sustainability as per in Bangladesh (WHO,2012) [11]. Consultants, who were responsible for the supervision of ICNIS as per national guideline, paid minimal attention to injury surveillance which may have contributed to the poor performance of ICNIS (table).

Poor monitoring and coordination were identified as a major gap. Appointing liaison nursing officers at wards which is a well-known strategy in other fields such as infection control in Sri Lanka contributed to improving coordination of ICNIS. Formation of the committee on NCD prevention as per national guideline and redesigning of midnight report with the inclusion of injury information facilitated the monitoring of ISS at some hospitals.

Conclusions

Coverage of ICNIS (7.2%) and timeliness of data entry to the system (11%) is unsatisfactory at BHK. Completeness and accuracy of few items in ISF which were below expected level indicate room for further improvement. Lack of capacity building, disagreement of staff on filling the ISF, unavailability of access to hospital data in the E- IMMR system, poor feedback mechanism, poor utilization of data, and poor monitoring are the identified negative factors on ICNIS.

Recommendations

1. As per national guidelines on injury surveillance, streamlining of the process of ICNIS by issuing and filing ISF at multiple entry points is recommended.
2. It is recommended to amend the current circular and guide enabling Nursing Officers to fill the ISF under the guidance of the medical officer who is treating the injured victim. Simplification of ISF is further recommended.
3. Arrangement of a Periodic In-service training mechanism on injury surveillance needs to be arranged by hospital management.
4. Providing uninterrupted access to hospital data in the e IMMR system with an analytical module at hospitals and RDHS level is necessary.

References

1. Auer AM, Dobmeier TM, Haglund JA, Tillgren P. ‘The relevance of WHO injury surveillance guidelines for evaluation: learning from the Aboriginal Community-Centered Injury Surveillance System (ACCESS) and

two institution-based systems', 2011. BMC Public Health, 11:744 [Online]. Available at: https://www.ncbi.nlm.nih.gov/pubmed/21958054 (Accessed: 6 November 2019).
2. Azadi A, Zavareh DK, Sadoughi F. 'Barriers and facilitators of implementing child injury surveillance system', Chinese Journal of Traumatology, 2011, 1008-1275. [Online]. Available at: https://www.sciencedirect.com/science/article/pii/S1008127518301846 (Accessed: 16 October 2019).
3. Fitzharris M, Yu J, Hammond N, Hammond N, Taylor C, Wu Y, *et al*. 'Injury in China: a systematic review of injury surveillance studies conducted in Chinese hospital emergency departments', 2011. BMC Emerg Med **11,** 18, [Online]. Available at: https://doi.org/10.1186/1471-227X-11-18 (Accessed: 26 January 2020).
4. Hon KL, Huang S, Poon WS, Cheung HMIP, Zee B. 'Mortality and Morbidity of Severe Traumatic Brain Injuries; A Pediatric Intensive Care Unit Experience over 15 Years', *Bull Emerg Trauma.* 2009; 7(3):256-262. [Online]. Available at: https://europepmc.org/article/PMC/6681874 (Accessed: 26 January 2020).
5. https://www.who.int/ncds/surveillance/steps/en/#content (no date) (Accessed: 26 January 2020).
6. Lakshmi PVM, Tripathy JP, Tripathy N, Singh S, Bhatia D, Jagnoor J, *et al*. 'A pilot study of a hospital-based injury surveillance system in a secondary level district hospital in India: lessons learnt and way ahead', 2016. *Open Access,* 3:24 [Online]. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5093103/ (Accessed: 26 January 2020).
7. Leanne R, Guthold R, Cowan M, Savin S, Bhatti L, Armstrong T, et al. "The World Health Organization STEP wise Approach to Non-communicable Disease Risk-Factor Surveillance: Methods, Challenges, and Opportunities", American Journal of Public Health. 2016; 1069(1):74-78. [Online]. Available at: https://ajph.aphapublications.org/doi/10.2105/AJPH.2015.302962 (Accessed: 16 October 2019).
8. Mitchell RJ, McClure RJ, Williamson AM, McKenzie, K. 'Implementing the national priorities for injury surveillance', The Medical Journal of Australia. 2008; 188(7):405-408. [Online]. Available at: https://www.mja.com.au/journal/2008/188/7/implementing-national-priorities-injury-surveillance (Accessed: 16 October 2019).
9. Ministry of Health, Nutrition & Indigenous Medicine, Sri Lanka Annual Acute NCD Report: Non-Communicable Disease Unit, 2017.
10. Ministry of Health, Nutrition & Indigenous Medicine, Sri Lanka National Injury Surveillance (NIS) System, 2016 [Online]. Available at: http://203.94.76.60/cmsmoh/upload/english/01-20-2016-eng.pdf (Accessed: 16 October 2019).
11. Ministry of Health, Sri Lanka. National Policy and Strategic Framework on Injury Prevention and Management in Sri Lanka, 2016. Non-Communicable Diseases (NCD) Unit, [Online]. Available at: http://203.94.76.60/nihs/English (NPIM). pdf (Accessed: 9 January 2020).
12. Ministry of Health and Indigenous Medical Services Sri Lanka Annual Health Bulletin, 2017. [Online]. Available at: http://www.health.gov.lk/moh_final/english/Public/elfinder/files/publications/AHB/2020/AHB_2017.pdf (Accessed: 16 October 2019).
13. Regional Directorate of Health Services Kegalle Annual Progress Report, 2018.
14. Ruth B, Tata LJ, Kendrick D. 'Identification of incident poisoning, fracture and burn events using linked primary care, secondary care and mortality data from England: implications for research and surveillance', *Injury Prevention.* 2016: 22**:**59-67. [Online]. Available at:https://injuryprevention.bmj.com/content/22/1/59.abstract (Accessed: 16 October 2019).
15. Stone D. 'Injury Surveillance- A good use of limited resources', 2012. College Of Medical Veterinary & Life Sciences, University Of Glasgow [Online]. Available at:https://www.fhs.gov.hk/english/archive/MCHconference2012/presentations/22.pdf (Accessed: 19 January 2020).
16. Unguryanu TN, Grjibovski AM, Trovik TA, Ytterstad B, Kudryavtsev AV. 'Injury registration for primary prevention in a provincial Russian region: setting up a new trauma registry', Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine. 2019; 27:47. [Online]. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6469089/ (Accessed: 16 February 2020).
17. World Health Organization Monitoring NCDs and their risk factors, A framework for surveillance. [Online]. Available at: https://www.who.int/nmh/publications/ ncd_report_chapter3. Pdf (Accessed: 16 October 2019).
18. World Health Organization. Fatal injury surveillance in mortuaries and hospitals: a manual for practitioners, Violence and Injury Prevention [Online], 2011. Available at: https://www.who.int/violence_injury_prevention/publications/surveillance/fatal_injury_surveillance/en/ (Accessed: 16 October 2019).
19. World Health Organization Injury prevention and control: a guide to developing a multisectoral plan of action, surveillance and research [Online], 2006. Available at: https://apps.who.int/iris/handle/10665/116504 (Accessed: 16 October 2019).
20. World Health Organization. Injury surveillance guidelines [Online], 2001. Available at: https://www.who.int/violence injury_prevention/en/ (Accessed: 16 October 2019).
21. World Health Organization Profile of injury surveillance systems in selected Member States of the Asia-Pacific region. WHO Regional Office for South-East Asia. [Online]. Available at: https://apps.who.int/iris/handle/10665/205661 (Accessed: 16 October 2019).