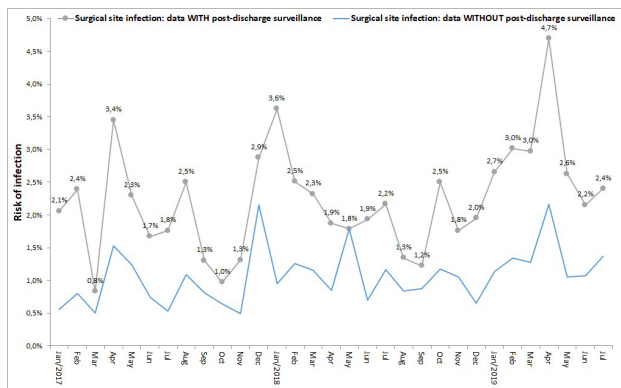Graph 3 - Surgical site infection: rate with and without post-discharge surveillance. Hospital Universitário Ciências Médicas (Jan/2017 to Jul/2019): endemic curve.

892. Meningitis after Ventricular Shunt Operations: Multicenter Study to Identify Etiology, Incidence and Risk Factors

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Session: P-42. HAI: Surgical Site Infections

Background. A Ventriculoperitoneal shunt is the main treatment for communicating hydrocephalus. Surgical site infection associated with the shunt device is the most common complication and an expressive cause of morbidity and mortality of the treatment.

The objective of our study is to answer three questions: a)What is the risk of meningitis after ventricular shunt operations? b) What are the risk factors for meningitis? c) What are the main microorganisms causing meningitis?

Methods. A retrospective cohort study assessed meningitis and risk factors in patients undergoing ventricular shunt operations between 2015/Jul and 2018/Jun from 12 hospitals at Belo Horizonte, Brazil. Data were gathered by standardized methods defined by the National Healthcare Safety Network (NHSN)/CDC procedure-associated protocols for routine SSI surveillance. Sample size = 926.

26 variables were evaluated by univariate and multivariate analysis (logistic regression).

Results. 71 patients were diagnosed with meningitis which represent a risk of 7.7% (C.I.95%= 6.1%; 9.6%). From the 26 variables, three were acknoleged as risk factors: age < two years old (OR = 3.20; p < 0.001), preoperative hospital length of stay > four days (OR = 2.02; p = 0.007) and more than one surgical procedure (OR = 3.23; p = 0.043). Patients two or more years old, who had surgery four days after hospital admission, had increased risk of meningitis from 4% to 6% (p = 0.140). If a patient < two years had surgery four days post hospital admission, the risk is increased from 9% to 18% (p = 0.026). 71 meningitis = > 45 (63%) the etiologic agent identified: *Staphylococcus aureus* (33%), *Staphylococcus epidermidis* (22%), *Acinetobacter sp* (7%), *Enterococcus sp* (7%), *Pseudomonas sp* (7%), and other (18%). Hospital length of stay in non-infected patients (days): mean = 21 (sd = 28), median = 9; hospital stay in infected patients: mean = 34 (sd = 37), median = 27 (p=0.025). Mortality rate in patients without infection was 10% while hospital death of infected patients was 13% (p=0.544).

Conclusion. Two intrinsic risk factors for meningitis post ventricular shunt, age under two years old and multiple surgeries, and one extrinsic risk factor, preoperative length of hospital stay, were identified. Incidence of meningitis post VP shunt decreases with urgent surgical treatment.

893. Occurrence's Prediction of Surgical Site Infection in Limb Amputation Surgery

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Session: P-42. HAI: Surgical Site Infections

Background. A research was conducted between July 2016 and June 2018 in five hospitals in Belo Horizonte, a city of 3,000,000 inhabitants, focused on surgical site infection (SSI) in patients undergoing limb amputation surgery procedure. The main objective is to statistically evaluate such incidences and enable a study of the prediction power of SSI through MLPs (Multilayer Perceptron), a pattern recognition algorithm.

Methods. Data were collected on SSI by the Hospital Infection Control Committees (CCIH) of the hospitals involved. The information was forwarded to the NOIS (Nosocomial Infection Study) Project. After data collection, three procedures were performed: a treatment of the database collected for the use of intact samples; a statistical analysis on the profile of the hospitals collected and; an assessment of the predictive power of five types of MLP (Backpropagation Standard, Momentum, Resilient Propagation, Weight Decay, and Quick Propagation) for SSI prediction. MLPs were tested with 3, 5, 7, and 10 hidden layer neurons and a database split for the resampling process (65% or 75% for testing, 35% or 25% for validation). They were compared by measuring AUC (Area Under the Curve - ranging from 0 to 1) presented for each of the configurations.

Results. From 969 data, only 507 were intact for analysis. Statistically: in 12.45% there was an incidence of global infection and that in 10.67% of the cases were SSI (among which, 94.6% had to be hospitalized for more than 10 days); patients were hospitalized on average 21 days (from 0 to 141 days); the average duration is 78 minutes (maximum 360 minutes); 53 deaths (a 16.98% death rate in case of SSI). A maximum prediction power of 0.688 was found.

Conclusion. Despite the loss rate of almost 40% of the database samples due to the presence of noise, it was obtained a relevant sampling to evaluate the profile the hospitals. For the predictive process, although some configurations reached 0.688, which makes promising the use of the automated SSI monitoring framework for patients undergoing limb amputation surgery. To optimize data collection and enable other hospitals to use the SSI prediction tool (available in www.sacihweb.com), two mobile application were developed: one for monitoring the patient in the hospital and the other for post-hospital discharge monitoring.

894. Patient and Surgery Characteristics on Wound Complication and Surgical Site Infection in Sarcoma Patients undergoing Hemipelvectomy

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Session: P-42. HAI: Surgical Site Infections

Background. Hemipelvectomy is associated with a significant risk of wound complications, including infections, bleeding and injuries to nearby neurovascular structures as well as the gastrointestinal and genitourinary tract. This study aimed to determine the patient characteristics and approach to treatment that could affect the occurrence of surgical site infection or wound complications in sarcoma patients undergone hemipelvectomy.

Methods. We conducted a retrospective analysis of 33 adult patients who underwent hemipelvectomy at Moffitt Cancer Center, Tampa, FL, from 2008 to 2016. We used Chi-square (Exact Fisher) test to investigate the association between wound complication and categorical variables. We used a T-test to evaluate the difference in numerical variables for outcomes.

Results. Out of 33 patients, 12 (36.4%) patients experienced wound complications after hemipelvectomy (Table 1). The average age of patients with wound complications was 63.3 3 (57.1±15.4) years old, significantly higher than that of patients without wound complications (p=0.004). Without adjustment, the use of computer navigation had a lower wound complication rate (p=0.027). Patients with wound complications had longer hospital length of stay (14.8 vs. 7.0 days, p=0.016). Among patients with surgical site infection (Table 2), there were no patients' characteristics or surgical characteristics associated with this outcome. Five (15%) patients developed surgical site infection and they had longer hospital stay (19.4 vs. 8.1 days, p=0.001). The organisms identified from wound cultures include methicillin-resistant *Staphylococcus aureus*, viridans Streptococcus, *Peptostreptococcus asaccharolyticus*, *Enterobacter cloacae*, *Pseudomonas aeruginosa*, *Candida albicans*. The organisms in late infections (more than 6 months since surgery), included above organisms plus *Stenotrophomonas maltophilia* and *Achromobacter xylosidans*.

Table 1. Demographic, tumor, surgery characteristics of patients with wound complication and without wound complication

Variable	Wound complication		p-value
	No (N=21)	Yes (N=12)	
Gender (Male)	9 (47.4)	7 (63.6)	0.3894
Age (years), mean (SD)	46.3 (16.3)	63.3 (12.4)	**0.0040**
Pre-op Radiotherapy	6 (28.6)	6 (50.0)	0.5124
Pre-op Chemotherapy	7 (33.3)	6 (50.0)	0.4650
Sarcoma	20 (95.2)	10 (83.3)	0.5381
Bone	14 (66.7)	5 (41.7)	0.2176
Soft tissue	7 (33.3)	7 (58.3)	
Margin status (positive)	4 (19.1)	3 (25.0)	0.6817
Tumor grade			0.6593
1	1 (4.8)	0 (0.0)	
2	8 (38.1)	3 (25.0)	
3	12 (57.1)	9 (75.0)	
Disease status			0.8957
ANED	8 (38.1)	6 (50.0)	
AWD	5 (23.8)	3 (25.0)	
Death	8 (38.1)	3 (25.0)	
Transfusion	16 (76.2)	10 (83.3)	1.000
Computer Navigation	16 (76.2)	4 (33.3)	**0.0265**
Extensive soft tissue component	10 (47.6)	9 (75.0)	0.1258
CLAVIEN			**0.0016**
No surgery needed (0,1,2)	19 (90.5)	5 (25.0)	
Surgery needed (3B)	1 (4.8)	7 (75.0)	
Tumor size, mean (SD)	9.3 (3.4)	10.8 (2.9)	0.2274
LOS (day), mean (SD)	7 (4)	14.8 (9.3)	**0.0156**
Transfusion units, mean (SD)	8 (7)	8.5 (7.1)	0.8656
EBL (mL), mean (SD)	2554.8 (1790.5)	2145.8 (1604.7)	0.5177
OR time (min), mean (SD)	405.9 (153.0)	376.7 (124.9)	0.5779

ANED = alive no evidence of disease, AWD = alive with disease, Clavien = Clavien-Dindo classification, LOS = length of stay, EBL = estimated blood loss, OR = operating room

Table 2. Demographic, tumor, surgery characteristics of patients between surgical site infection and without surgical site infection

Variable	Surgical site infection		p-value
	No (N=28)	Yes (N=5)	
Gender (Male)	13 (52.0)	3 (60.0)	1.000
Age (years), mean (SD)	53.0 (17.5)	49.8 (15.1)	0.7072
Pre-op Radiotherapy	9 (32.1)	3 (60.0)	0.6184
Pre-op Chemotherapy	10 (35.7)	3 (60.0)	0.3600
Sarcoma	27 (96.4)	3 (60.0)	0.0532
Bone	18 (64.3)	1 (20.0)	0.1376
Soft tissue	10 (35.7)	4 (80.0)	
Margin status (positive)	6 (21.4)	1 (20.0)	1.000
Tumor grade			0.2684
1	1 (3.6)	0 (0.0)	
2	11 (39.3)	0 (0.0)	
3	16 (57.1)	5 (100.0)	
Disease status			0.5782
ANED	13 (46.4)	1 (20.0)	
AWD	6 (21.4)	2 (40.0)	
Death	9 (32.1)	2 (40.0)	
Transfusion	22 (78.6)	4 (80.0)	1.000
Computer Navigation	19 (67.9)	1 (20.0)	0.0657
Extensive soft tissue component	15 (53.6)	4 (80.0)	0.3662
CLAVIEN			0.0854
No surgery needed (0,1,2)	22 (78.6)	2 (40.0)	
Surgery needed (3B)	5 (17.9)	3 (60.0)	
Tumor size, mean (SD)	9.9 (3.4)	9.4 (2.5)	0.7449
LOS (day), mean (SD)	8.1 (5.7)	19.4 (9.0)	**0.0008**
Transfusion units, mean (SD)	8.1 (6.9)	8.6 (7.7)	0.8822
EBL (mL), mean (SD)	2537.5 (1786.5)	1670.0 (1043.8)	0.3038
OR time (min), mean (SD)	385.9 (146.4)	448.0 (113.5)	0.3762

ANED = alive no evidence of disease, AWD = alive with disease, Clavien = Clavien-Dindo classification, LOS = length of stay, EBL = estimated blood loss, OR = operating room

Conclusion. Older patients undergoing hemipelvectomy are at an increased risk of developing wound complications with a prolonged hospital stay. Initial antimicrobial therapy for suspected surgical site infection should include a broad-spectrum coverage to include skin and gastrointestinal flora.

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895. Prediction of Occurrence for Surgical Site Infection in Infected Surgeries

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Session: P-42. HAI: Surgical Site Infections

Background. A survey was carried out in five hospitals, between July 2016 and June 2018, on surgical site infection (SSI) in patients undergoing infected surgery procedures, in the city of Belo Horizonte (3,000,000 inhabitants). The general objective is to statistically evaluate such incidences and enable an analysis of the SSI predictive power, through MLP (Multilayer Perceptron) pattern recognition algorithms.

Methods. Through the Hospital Infection Control Committees (CCIH) of the hospitals, a data collection on SSI was carried out. Such data is used in the analysis during your routine SSI surveillance procedures. So, three procedures were performed: a treatment of the collected database for use of intact samples; a statistical analysis on the profile of the collected hospitals and; an assessment of the predictive power of five types of MLPs (Backpropagation Standard, Momentum, Resilient Propagation, Weight Decay and Quick Propagation) for SSI prediction. The MLPs were tested with 3, 5, 7 and 10 neurons in the hidden layer and with a division of the database for the resampling process (65% or 75% for testing, 35% or 25% for validation). They were compared by measuring the AUC (Area Under the Curve - ranging from 0 to 1) presented for each of the configurations.

Results. From 1770 records, 810 were intact for analysis. It was found that: the average age is 53 years old (from 0 to 98 years old); the surgeries had an average time of approximately 140 minutes; the average hospital stay is 19 days, the death rate reached 10.86% and the SSI rate was 6.04%. A maximum prediction power of 0.729 was found.

Conclusion. There was a loss of 54% of the database samples due to the presence of noise. However, it was possible to have a relevant sample to assess the profile of these five hospitals. The predictive process, presented some configurations with results that reached 0.729, which promises the use of the structure for the monitoring of automated SSI for patients submitted to infected surgeries. To optimize data collection, enable other hospitals to use the prediction tool and minimize noise from the database, two mobile application were developed: one for monitoring the patient in the hospital and another for monitoring after hospital discharge. The SSI prediction analysis tool is available at www.nois.org.br.

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896. Prediction of Surgical Site Infection Risk in Patients Undergoing Bariatric Surgery

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Session: P-42. HAI: Surgical Site Infections

Background. In the hospitals of Belo Horizonte (a city with more than 3,000,000 inhabitants), a survey was conducted between July 2016 and June 2018, focused on surgical site infection (SSI) in patients undergoing bariatric surgery procedures. The main objective is to statistically evaluate such incidences and enable a study of the prediction power of SSI through MLPs (Multilayer Perceptron), a pattern recognition algorithm.

Methods. Data were collected on SSI by the Hospital Infection Control Committees (CCIH) of the hospitals involved in the research. After data collection, three procedures were performed: a treatment of the database collected for the use of intact samples; a statistical analysis on the profile of the hospitals collected and; an assessment of the predictive power of five types of MLP (Backpropagation Standard, Momentum, Resilient Propagation, Weight Decay, and Quick Propagation) for SSI prediction. MLPs were tested with 3, 5, 7, and 10 hidden layer neurons and a database split for the resampling process (65% or 75% for testing, 35% or 25% for validation). They were compared by measuring AUC (Area Under the Curve - ranging from 0 to 1) presented for each of the configurations.

Results. From 3473 initial data, only 2491 were intact for analysis. Statistically, it was found that: the average age of the patients was 39 years (ranging from 16 to 65); the average duration of surgery was 138 minutes; and 0.8% of patients had SSI. Regarding the predictive power of SSI, the experiments have a minimum value of 0.350 and a maximum of 0.756.

Conclusion. Despite the loss rate of almost 30% of the database samples due to the presence of noise, it was possible to have a relevant sampling for the profile evaluation of Belo Horizonte hospitals. Moreover, for the predictive process, although some configurations have results that reached 0.755, which makes promising the use of the structure for automated SSI monitoring for patients undergoing bariatric surgery. To optimize data collection and enable other hospitals to use the SSI prediction