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CLINICAL DECISION SUPPORT SYSTEM FOR DIAGNOSTIC OF INFECTED PANCREATIC NECROSIS

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Introduction

- **Infected pancreatic necrosis** (IPN) is a primary cause of death in patients with acute pancreatitis (AP)
- The **diagnosis** of the transition of sterile pancreatic necrosis to infected pancreatic necrosis is a difficult task
- In our work we used an **artificial neural network** (ANN) as an alternative prognostic system with high positive predictive values to diagnose IPN
- The **aim** - to determine whether an ANN can diagnose pancreatic infection in patients with severe acute pancreatitis

Methods

- All patients who presented with severe acute pancreatitis **from January 2010 to December 2018** were reviewed

- The study included **398** patients:

- **age** (ME, range) - **49** (23-77);

- **sex** males/females (n) - **302/96**

- **SAPS II** at admission, grades - **12.9**±3.8

- pancreatic necrosis **etiology**, %: alcohol 62.6%, biliary 20.6%, idiopathic 12.2%, traumatic 4.6%

Methods

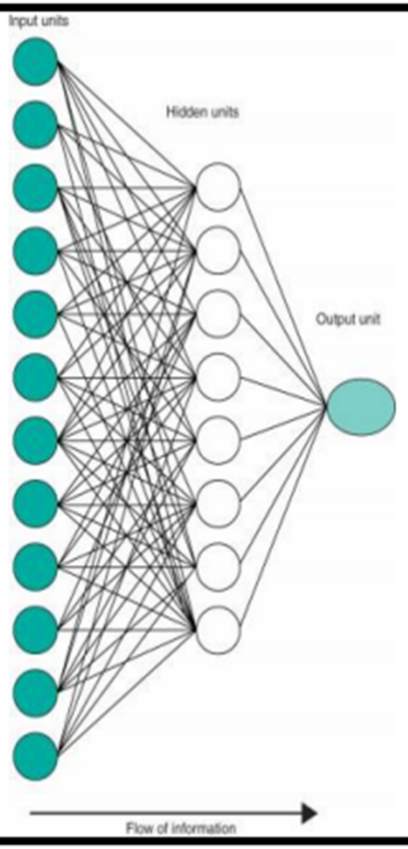
- Presenting daily dynamic observation data were collected:
- **Consequently studied parameters:**

SAPS II score, multiple organ system failure, systemic inflammatory response syndrome, respiratory rate, intra-abdominal hypertension, hemoglobin, hematocrit, platelet count, prothrombin, fibrinogen, glucose, BUN, creatinine, albumin, bilirubin, ALT, AST, calcium, C-reactive protein, LDH, pO2/ fiO2, base excess et al.

Results

Table 1. Input variables used to develop the artificial neural network model for IPN prediction

Variable	Data format	Error	Sensitivity (%)
Early surgery (days 0-14)*	Yes / No	0.52%	2.38%
Duration of treatment in ICU (days)	Continuous variable	0.38%	1.75%
Duration of in-hospital stay (days)	Continuous variable	0.37%	1.71%
Clinical deterioration§	Yes / No	0.36%	1.67%
Serum glucose level‡	Continuous variable	0.34%	1.56%
Temperature	Continuous variable	0.33%	1.52%
Heart rate	Continuous variable	0.25%	1.15%
Serum blood urea nitrogen	Continuous variable	0.24%	1.10%
Leukocyte count	Continuous variable	0.24%	1.08%
Respiratory rate	Continuous variable	0.23%	1.06%
CRP	Continuous variable	0.22%	1.00%
Paresis (intra-abdominal hypertension)	Yes / No	0.21%	1.00%



*Early surgery was conducted in some cases before IPN developed

§Clinical deterioration represented a "second wave" of the disease and was based on interpretation either APACHEII or SAPSII scores

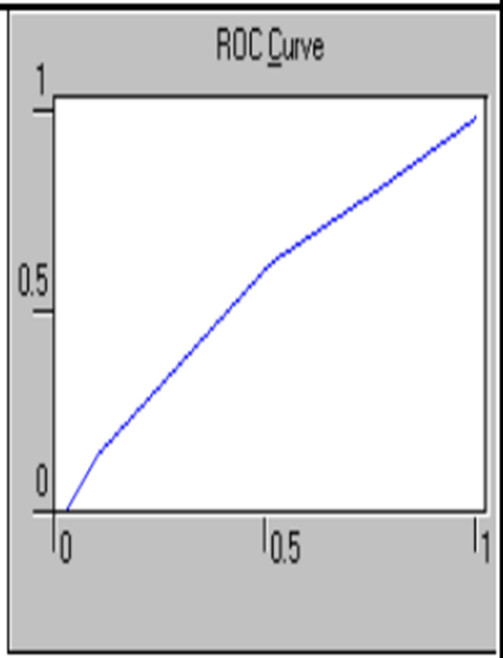
‡Serum glucose level in non-diabetic patients

Results

Table 2. Prediction of development of infected pancreatic necrosis using SAPS II in comparison to ANN

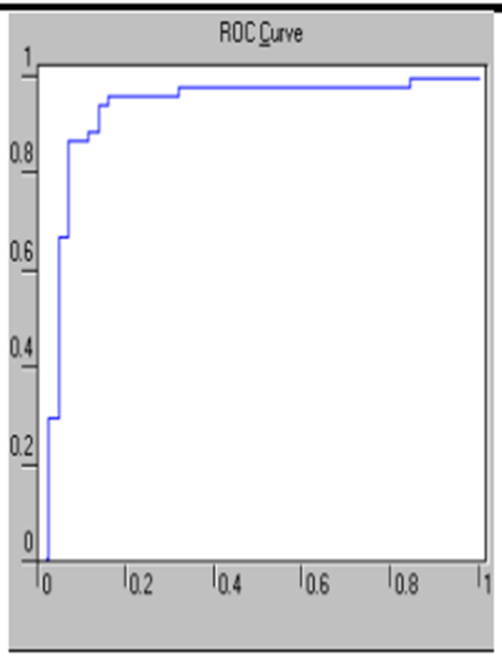
	SAPS II	ANN
Sensitivity	31.9%	41.5%
Specificity	42.6%	96.8%
Accuracy	53.6%	94.7%
Positive predictive value	62.8%	92.2%
Negative predictive value	44.1%	96.8%

SAPS II



AUC=0.62

ANN



AUC=0.92

Conclusion

Clinical decision support system was able to diagnose the development of infected necrotizing pancreatitis with considerable accuracy and outperformed SAPS II

ANN can be trained successfully to assist clinicians in predicting and diagnosis **IPN**

Thank you for your attention!