

Performing Duplex within 72 Hours of Transient Ischemic Attack May Decrease Mortality, the Israeli National Program for Quality Indicators experience

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ABSTRACT

Background: With diagnostic imaging, such as a duplex of the carotid arteries, finding of stenosis and atherosclerotic plaque and consequent end arterectomy may be important for decreasing the danger of developing cerebrovascular accident after transient ischemic attack (TIA).

Objectives: To measure performance rates of duplex of carotid arteries within 72 hours of TIA diagnosis.

Methods: The denominator included all patients who were admitted to emergency departments because of TIA, and the numerator included those who underwent duplex within 72 hours of admission. Inclusion criteria included all patients older than 18 years who were admitted because of TIA according to the ICD9 codes.

Results: Measuring this indicator started in 2015 with 5504 patients and a 58% success rate. The figures for the years 2016, 2017, and 2018 were 5309, 5447, and 5278 patients with success rates of 73%, 79%, and 83%, respectively. Six of 26 hospitals (23.0%) reached the target of 80% in 2018. From 2015 to 2018 a total of 21,538 patients were admitted to emergency departments in Israel and diagnosed with TIA. Of these, 15,722 (72.9%) underwent duplex within 72 hours. The mortality rate within 30 days from diagnosis was 0.81% in patients who performed duplex within 72 hours of diagnosis and 2.37% in patients who did not, odds ratio 2.676, 95% confidence interval 2.051–3.492, $P < 0.0001$. These results indicate a statistically significant decrease of 65.82%.

Conclusions: A significant decrease in mortality was noted in patients with a new diagnosis of TIA who underwent duplex within 72 hours of diagnosis.

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KEY WORDS: cerebrovascular accident (CVA), duplex, Israeli National Program for Quality Indicators (INPQ), quality indicators, transient ischemic attack (TIA)

THE ISRAELI NATIONAL PROGRAM FOR QUALITY INDICATORS

The National Program for Quality Indicators (INPQ) of the Israeli Ministry of Health was established in 2013. Starting with five clinical quality indicators the plan expanded to 75 indicators in 2018. Most of the indicators measure processes rather than outcomes. Still, the aim of the program is to improve the quality of patient management and to achieve better results. Every year the indicators are measured and published. The INPQ includes indicators for mother and baby health, pre-hospital care, general hospitals, geriatric hospitals, and mental health institutions.

THE IMPORTANCE OF EARLY PERFORMANCE OF DUPLEX IN TRANSIENT ISCHEMIC ATTACK

Transient ischemic attack (TIA) is a short episode of neurological deficit caused by a reversible focal ischemia of the brain, which is not advancing to cerebrovascular accident (CVA) [1]. Up to 2.3% of the adults in the United States reported such an episode at least once in their lifetime, which is probably an underestimation of the true prevalence [2]. The number of TIA hospitalizations decreased between 2000 and 2010 from 118 to 83 per 100,000 people in the United States, probably due to improved diagnosis and treatment [3].

The risk to develop CVA within 30 and 90 days of TIA diagnosis is 8% and 9.2%, respectively [4,5]. In a systematic review and a meta-analysis it was shown that the chance to develop CVA after TIA that has been properly treated was 1.36%, 2%, 2.8%, and 3.4% after 2, 7, 30, and 90 days from diagnosis, respectively [6]. A properly used diagnostic imaging tool, such as duplex of the carotid arteries, computerized tomography arteriography (CTA), MRI arteriography (MRA), or transcranial doppler in addition to effective follow-up treatment may be key to decreasing the danger of developing CVA and subsequent mortality [7-9]. This quality indicator is supported by the INPQ.

PATIENTS AND METHODS

DESCRIPTION OF THE INDICATOR

We measured duplex performance for the diagnosis of carotid artery stenosis within 72 hours of admission for TIA. The denominator included all the patients who were admitted because of TIA, and the numerator included those who underwent duplex within 72 hours of admission. Inclusion criteria included all the patients older than 18 years who were admitted because of TIA according to the ICD9 codes. Exclusion criteria included patients with acute CVA or with different neurological diagnosis such as intracerebral hemorrhage. There was no target for the first year of measuring (2015). The target was 65% for 2016, 75% in 2017, and 80% in 2018.

MEASURING

Data computed for each case included the number of admissions, socioeconomic status, date of hospitalization, date of discharge, date of birth, date of death, sex, and date of performing duplex.

VALIDATION

Indicator results were reported every 3 months to a dedicate server (safe) at the INPQ. Data were examined for accuracy by independent observers before acceptance to the server. Next, senior nurses and investigators validated a statistically significant sample of the reported indicators, and when approved referred the results for statistical evaluation and final approval.

COMPARISON AND PUBLICATION

Hospitals were compared every year according to the indicator results, and annual national achievements were computed. Indicator targets increased every year according to the achievements. The results were published annually in the media and presented at the Quality and Safety annual meeting of the Israeli Ministry of Health.

STATISTICAL METHODS

We looked at changes along time in the indicator achievements as well as the 30-day mortality rates of patients who underwent duplex within 72 hours of TIA diagnosis and those who did not. A logistic regression model reflected age, sex, day of admission, hospital size and location, private or public health system, and time to duplex performance. This model could not demonstrate that one independent variable significantly influenced correlation between the indicator result and prevention of mortality.

RESULTS

Measuring indicator of duplex performance within 72 hours of diagnosis in patients with TIA started in 2015 with 5504 patients and 58% success rate [Figure 1]. The following figures

for the years 2016, 2017, and 2018 were 5309 cases with 73% success rate, 5447 cases with 79% success rate, and 5278 cases with 83% success rate, respectively. Six of 26 hospitals (23.0%) reached the goal of 80% in 2018. From 2015 to 2018, 21,538 patients were admitted to the emergency departments in Israel and diagnosed as TIA. Of these, 15,722 (72.9%) underwent duplex within 72 hours, and 5816 (27.1%) did not.

Stratifying results according to the day of the week, success rates for 2015, 2016, 2017, and 2018 were 62%, 77%, 82%, and 84% for days Sunday, Monday, Tuesday, Friday, and Saturday and 48%, 65%, 72%, and 80% for Wednesday and Thursday, respectively [Figure 2A]. Comparing patients who were discharged from the emergency department or left against medical advice and those who were hospitalized, we found success rate for 2016, 2017, and 2018 of 41%, 56%, and 48% versus 79%, 85%, and 88%, respectively [Figure 2B]. The effect of age on success rate in 2015, 2016, 2017, and 2018 in patients younger than 64 years was 62%, 75%, 82%, and 84%. In patients 65–84 years of age it was 58%, 75%, 81%, and 84%. In patients older than 84 years success rate was 45%, 63%, 67% and 75%, respectively [Figure 2C]. There was no significant statistical difference between men and women. INPQ has no clinical data on background diseases or medications.

The mortality rate within 30 days of the TIA diagnosis was 0.81% in patients who underwent duplex within 72 hours of the diagnosis and 2.37% in the patients who did not, respectively, with odds ratio of 2.676, 95% confidence interval 2.051–3.492, $P < 0.0001$ [Figure 3]; a statistically significant decrease of 65.82%.

Figure 1. Duplex within 72 hour of diagnosis in patients with transient ischemic attack (N=21,538). Comparison of success rates (%), 2015–2018

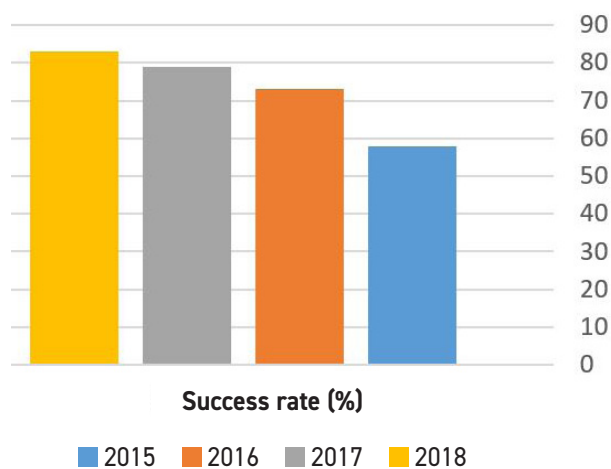


Figure 2. Stratifying results according to the weekdays (2015–2018) Comparison of success rates (%) (N=21,538)

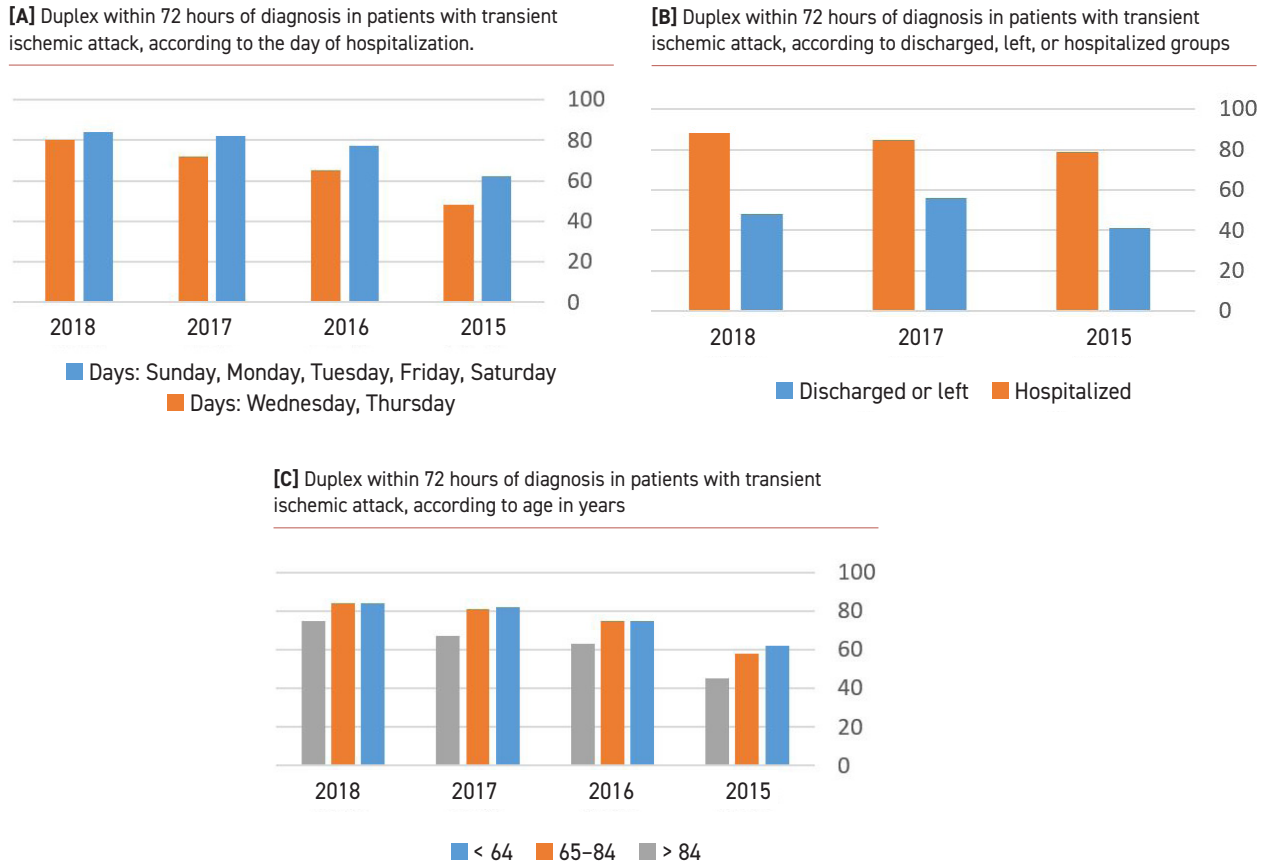
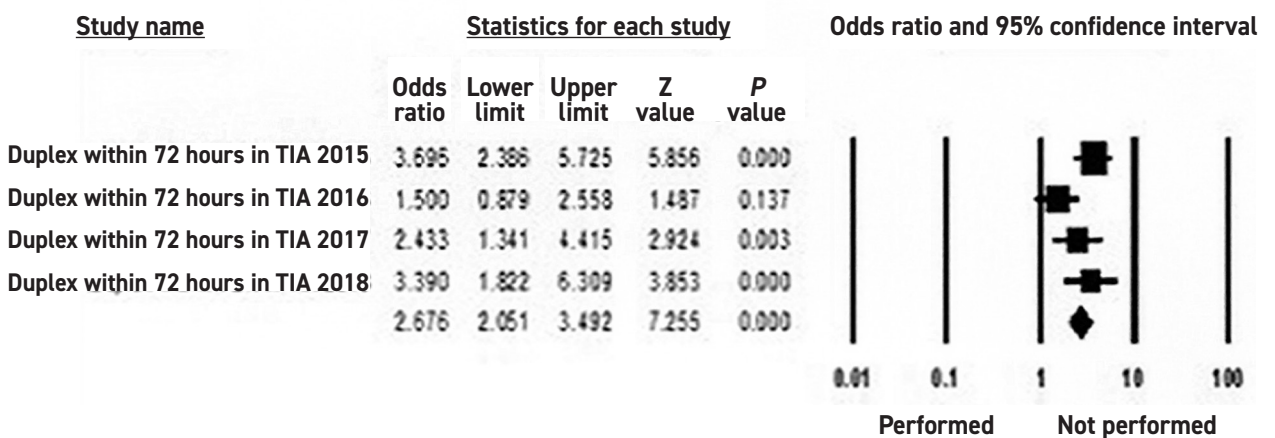


Figure 3. Comparison of mortality rates between patients who underwent duplex within 72 hours and those who did not



DISCUSSION

Within 4 years, we achieved a significant increase in performance rate of duplex of the carotid arteries within 72 hours of diagnosis of TIA, from 58% to 83%, even though the target of the indicator increased every year, from 65% in 2016 to 80% in 2018. This success rate was followed by a significant decrease of 30-day mortality, from 2.37% in patients who did not undergo duplex within 72 hours to 0.81% in patients who did. The success rate differed in specific days of hospitalization was better from Friday to Tuesday, than on Wednesday and Thursday, probably due to better chance to achieve duplex on working days (72 hours since admission) than on weekend. Younger age significantly correlated with duplex performance. In patients older than 84 years, duplex performance decreased by 9% in 2018.

LIMITATIONS

Our study was limited due to the epidemiological approach used to study clinical issues. We could not know the causes of mortality nor establish a cause and effect between mortality and duplex performance within 72 hours of TIA diagnosis. Since duplex performance was lower in older age we cannot exclude the possibility of background diseases as a cause for the higher mortality rates in patients who did not undergo duplex within 72 hours of TIA onset.

CONCLUSIONS

Duplex performance within 72 hours of diagnosis of TIA is strongly recommended by guidelines in the United States and Europe and by the Israeli Ministry of Health [2,4,9]. The experience of the INPQ supports this approach. A significant decrease in mortality was noted in patients with a new diagnosis of TIA who underwent this procedure within 72 hours of diagnosis.

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Data are available upon reasonable request.

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