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Short Communication

Transplantation crisis at the time of economic recession in Greece

E. Giorgakis^{a,*}, A.L. Singer^a, S.E. Khorsandi^b, A. Prachalias^b^a Division of Transplant Surgery, Mayo Clinic, Phoenix, AZ, United States^b Institute of Liver Studies, King's College Hospital, London, United Kingdom

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ABSTRACT

Objectives: Aim of the study was to assess the effect of economic recession on organ donation and transplantation in Greece.

Methods: Retrospective data (2002–2016) provided by the Hellenic Transplant Organization (HTO), International Registry in Organ Donation and Transplantation, Eurotransplant, Scandiatransplant, National Health Service Blood and Transplant (NHSBT), and United Network of Organ Sharing (UNOS) databases were analyzed. HTO database was divided into the precrisis (2002–2008) and crisis (2009–2016) era. Donation and transplantation rates between the two periods were compared. Trend estimation analysis was applied on the latter period.

Results: Since 2009, organ donation significantly declined without significant change in the reported brain deaths. Overall solid organ transplantations decreased (319.63 ± 70.4 from 460 ± 55.25 transplants/year, $P = 0.001$). Kidney transplantation rates declined (139.38 ± 29.7 from 209.43 ± 20.9 transplants/year, $P = 0.000$), with dramatic reduction in both deceased (99 ± 27.5 from 136.43 ± 131.4 transplants/year, $P = 0.030$) and living donor kidney transplantations (40.38 ± 6.1 from 73 ± 12.5 transplants/year, $P = 0.000$). Liver, heart, and lung transplant rates were not significantly affected; however, they have been low throughout both periods. Conversion to donation has not been affected by the crisis. Time series logistic regression of the crisis period demonstrated declining trends in organ donation, total solid organ transplantation, and deceased donor kidney, liver, and lung transplantation. In 2015, Greek organ donation rates were inferior to Eurotransplant, Scandiatransplant, NHSBT, UNOS, and Italy.

Conclusions: There has been a temporal correlation between the economic recession and organ donation and transplantation crisis in Greece. Irrespective of the cause, measures should be taken to reverse this in order to avert the increased morbidity and mortality on the transplant waiting list.

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Greece is among the countries hit the hardest by the European financial crisis. Cuts to health and social welfare imposed by the European Commission, European Central Bank, and International Monetary Fund have had deleterious

consequences on the health of Greek people: stillbirths, child poverty, and malnutrition rates have been on the rise, along with mental health problems, suicides, suicidal attempts, and fatal treatment-related adverse events.^{1–3} Age-adjusted

* Corresponding author.

E-mail address: giorgakis.emmanouil@mayo.edu (E. Giorgakis).<https://doi.org/10.1016/j.puhe.2018.03.031>

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retrospective analysis of mortality data obtained from the Hellenic Statistical Authority and Eurostat indicate that an extra 242 deaths per month were potentially linked to austerity, reflecting a deterioration in quality of care during an economic recession.^{3,4}

The aim of this work was to assess the effect of the economic recession on organ donation and transplantation in Greece. We analyzed the data (2002–2016) provided by the Hellenic Transplant Organization (HTO), International Registry in Organ Donation and Transplantation, Eurotransplant, ScandiTransplant, National Health Service Blood and Transplant (NHSBT), and United Network of Organ Sharing (UNOS).^{5,6} HTO data were divided into two periods: before (2002–2008) and after the onset of the financial crisis (2009–2016). The mean reported brain deaths, organ procurements, donations per million of population (dpmp), donation-to-conversion rates, and solid organ transplantations performed in the two periods were compared via unpaired *t*-testing. Time series regression analysis was applied on the HTO data (GraphPad Software, La Jolla, CA, USA).

At the recession onset, the up-trending slope in organ donation in Greece, which had reached 8.9 dpmp in 2008, was reversed, even though there has not been significant drop in the reported brain deaths (116.88 ± 43.8 vs 143 ± 58.77 brain deaths, $P = 0.340$). Since the onset of crisis, donation rates have been decreasing (5.38 ± 1.4 dpmp vs 6.91 ± 1.2 dpmp, $P = 0.040$), reaching a nadir of 3.5 dpmp in 2015 (Fig. 1A); procurement rates (59.25 ± 15.2 procurements/year) have

been lower than before crisis (76 ± 13.24 procurements/year, $P = 0.04$). Conversion-to-donation rates remained largely unaffected ($P = 0.430$).

Overall solid organ transplantation rates have declined (319.63 ± 70.4 vs 460.57 ± 55.25 solid organ transplants/year, $P = 0.001$). Kidney transplantation rates declined (139.38 ± 29.7 from 209.43 ± 20.9 kidney transplants/year, $P = 0.000$), with dramatic reduction in both deceased (99 ± 27.5 from 136.43 ± 131.4 , $P = 0.030$) and living donor kidney transplantation (40.38 ± 6.1 from 73 ± 12.5 , $P = 0.000$). Liver transplantation (LT) activity has been low throughout (30.75 ± 9 vs 32.14 ± 12.24 liver transplants/year, $P = 0.80$), with a single LT center remaining active (Fig. 1B). Pediatric and living donor LT, small bowel, pancreas transplantation, donation after cardiac death, and split liver donation are non-existent. Simultaneous kidney-pancreas transplantation (SPK) also remains dormant, with a total of six SPKs being performed since 2002, and none from 2011. Heart transplantation has not been affected by the crisis (8.75 ± 4.4 vs 8.14 ± 3.85 , heart transplants/year, $P = 0.781$).

Time series logistic regression of the crisis period (2009–2016) demonstrated ongoing reduction of organ donation and transplantation while the crisis was evolving: donation rates were worsening through the crisis (slope -0.44 dpmp ± 0.14 , 95% CI $[-0.76$ to -0.12 dpmp] $P = 0.0013$); similarly, scatter plot analysis demonstrated a negative linear relationship of total solid transplants, deceased donor kidney, and LT rates with the years into the crisis (total solid transplants

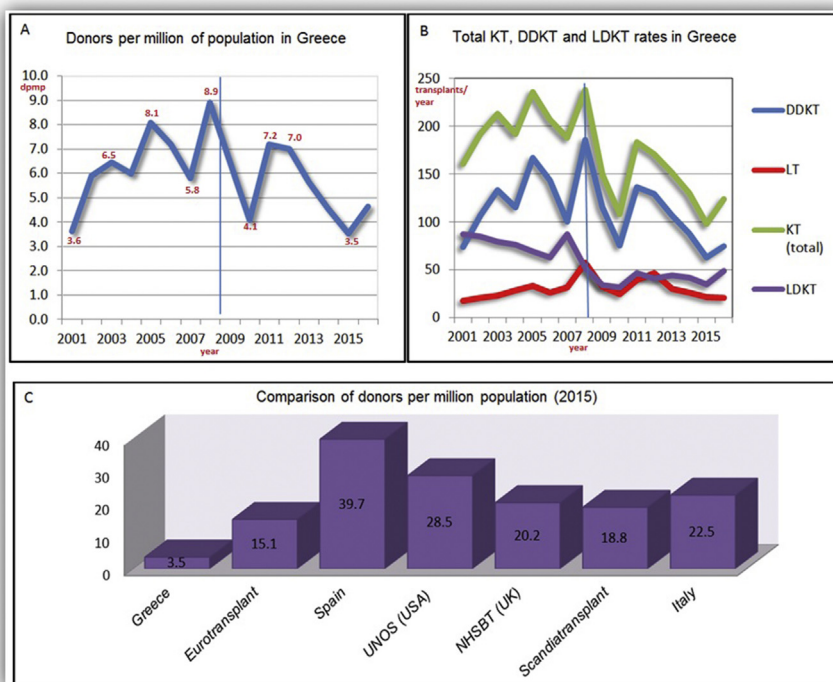


Fig. 1 – (A) Donors per million of population (dpmp) per year in Greece; (B) Number of LT, KT, DDKT, and LDKT performed in Greece, per year; (C) Comparison of dpmp among Greece and other transplant networks. KT, kidney transplantation; LT, liver transplantation; DDKT, deceased donor kidney transplantation; LDKT, live donor kidney transplantation; Eurotransplant, transplant network of Austria, Belgium, Croatia, Germany, Hungary, Luxembourg, the Netherlands, and Slovenia; UNOS, United Network of Organ Sharing, US; NHSBT, National Health Service Blood and Transplant, UK; ScandiTransplant, transplant network of Finland, Sweden, Norway, Denmark, and Iceland.

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