



## Nephrology in Puducherry

### Abstract

We discuss the development of nephrology in Puducherry and provide an overview of nephrology clinical services, training opportunities, and research activities. Puducherry, as a union territory, has historically enjoyed better health statistics than the national average in India and has been a focal point for medical education. Puducherry has a robust health infrastructure both in the public and private sectors. Nephrology clinical services, such as dialysis and kidney transplantation (from living and deceased donors), renal pathology, and interventional nephrology services, are readily available and accessible to all sections of society, offering the full range of the latest therapies and technologies. Training opportunities in Nephrology and Dialysis technology are accessible, and academic institutions in Puducherry have contributed significant research on kidney diseases relevant to the region.

**Keywords:** Nephrology, History, Puducherry, Dialysis, Kidney transplantation

### Introduction

Puducherry is a union territory (UT – administered directly by the union government) in South India. Puducherry has a history of being colonized by the French, unlike most of India, which was under British rule. The UT comprises the four geographically and linguistically disparate former French enclaves of Puducherry, Karaikal, Mahe, and Yanam. These enclaves were administratively clubbed together as a UT at the time of the "de jure transfer" of power to the Indian government in 1962. Their capital was in Puducherry (490 sq km, population 16.17 lakhs), located on the eastern coast of the Indian peninsula about 150 km towards the south of Chennai.<sup>1</sup> Karaikal (157 sq km, population 2.47 lakhs) also located on India's east coast, 150 km further south of Puducherry. Mahe (9 sq km, population 47,800) is on the western coast of the Indian peninsula at 500 km from Puducherry. The fourth region, Yanam (30 sq km, population 1.05 lakhs), is located on the east coast, 800 km north of Puducherry.<sup>2</sup>

Puducherry has a robust healthcare system that includes two government and seven private medical colleges and a well-established public health system with general hospitals and health centers.

The health indicators of Puducherry are better than the national average and even the adjacent state of Tamil Nadu. Puducherry has the highest doctor-patient ratio amongst all states and UTs in India. The per capita healthcare expenditure in Puducherry is INR 3340, which is more than double the national average. Puducherry boasts a rich history of medical education dating back to the early 19th century under French colonial rule. The "Ecole de Medicine de Pondicherry", a French medical school, was founded in 1823 and was one of the first institutions to provide training in Western medicine in Asia. After the independence and transfer of Puducherry to India in 1964, the institute was upgraded to a Regional Postgraduate Center and renamed the Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER). Today, JIPMER is one of the leading medical education and research institutes, consistently ranked among the country's top five medical colleges.

### History of nephrology in Puducherry

The history of nephrology traces back to the early 1980s when physicians started practicing intermittent (acute) peritoneal dialysis (IPD). The first hemodialysis (HD) was performed in Puducherry under the Department of Medicine at JIPMER in 1976

Swathy Raju<sup>1</sup>,  
K. Kumar<sup>1</sup>, Sreejith  
Parameswaran<sup>1</sup>

<sup>1</sup>Department of Nephrology,  
Jawaharlal Institute of  
Postgraduate Medical  
Education & Research (JIPMER),  
Puducherry, India

### Corresponding author:

Sreejith Parameswaran,  
Department of Nephrology,  
Jawaharlal Institute of  
Postgraduate Medical  
Education & Research (JIPMER),  
Pondicherry, India. E-mail:  
spameswaran@outlook.com

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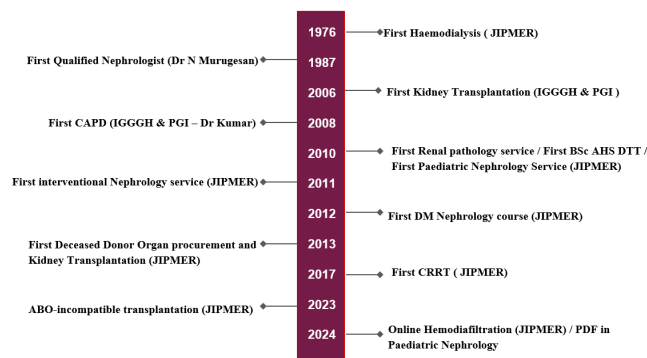
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[Figure 1]. Dr. N. Murugesan became the first qualified nephrologist of Puducherry in 1987. He started the HD services at the Indira Gandhi Government General Hospital & Postgraduate Institute (IGGGH & PGI) in 1988. Also, Dr. Murugesan initiated the first kidney transplantation program in Puducherry at IGGGH & PGI with a living donor kidney transplantation performed on 28th March 2006. In 2008, under the leadership of Dr K Kumar, IGGGH & PGI became the first hospital to offer continuous ambulatory peritoneal dialysis (CAPD) services in Puducherry. In 2010, a Pediatric Nephrology service was started at JIPMER by Dr. Sriram Krishnamurthy under the department of Pediatrics. Interventional nephrology services at JIPMER from 2011 onwards included percutaneous placement of the Tenckhoff catheter, tunnelled hemodialysis catheter placement, and thrombolysis of thrombosed AV fistula by the nephrologist. The first instance of deceased donor organ procurement and transplantation in Puducherry was on the 5th of December 2013 at JIPMER. Continuous renal replacement therapy (CRRT) was introduced in Puducherry in 2017 (JIPMER). Dr M. Venkatram completed formal training as an interventional nephrologist in Seoul under a fellowship from the International Society of Nephrology. He started an interventional nephrology service upon returning to East Coast Hospital in 2022. The first ABO incompatible kidney transplantation in Puducherry was performed in September 2023 at JIPMER. An online hemodiafiltration facility was commissioned in March 2024 at JIPMER.

Formal training in nephrology (DM Nephrology) is offered by an institution (JIPMER) in Puducherry since 2012, currently with an intake of three candidates per year, and no centers are offering DNB training in Puducherry. Four centers offer bachelor programs for dialysis technology courses; one provides a master's degree.

**Current status of nephrology clinical services in Puducherry**

Twenty-four hospitals in Puducherry offer HD services, of which four are government institutions. There are



**Figure 1:** Evolution of nephrology services in Puducherry. JIPMER: Jawaharlal Institute of Postgraduate Medical Education & Research, CAPD: continuous ambulatory peritoneal dialysis, CRRT: continuous renal replacement therapy, IGGGH: Indira Gandhi Government General Hospital, PGI: Postgraduate Institute, AHS: Allied Health Sciences, DTT: Dialysis Technology, PDF: Post-Doctoral Fellowship

18 qualified nephrologists in Puducherry and a total of 285 hemodialysis machines, two-thirds of which are in private-sector hospitals. Four institutions offer kidney transplantation (living and deceased donors). The nephrology services at hospitals in Puducherry cater to a broader population outside the territorial limits of Puducherry, including the adjacent districts of Tamil Nadu. Out of 1123 patients on dialysis currently in Puducherry, 500 are Tamil Nadu and Kerala residents. Table 1 summarizes the nephrology infrastructure in Puducherry.

In-house renal pathology service is available at one institute (JIPMER), including three formally trained renal pathologists. The service offers immunofluorescence and immunohistochemistry services, including special stains, and an electron microscopy facility is expected to be commissioned in the year 2025. JIPMER also provides a formal training program in renal pathology (Postdoctoral fellowship in renal pathology).

**Table 1: Puducherry nephrology statistics**

Snapshot of Nephrology Clinical Services & Training in Puducherry	
Number of nephrologists	18
Hospitals providing kidney care	24 (4 Public sector, 20 Private)
Centres with an organised pediatric nephrology service	01 (JIPMER)
Number of kidney transplant centres	04
Number of kidney transplantation operations performed in 2023	60
Centers offering DM/DrNB nephrology	01 (JIPMER)
Centres offering formal training in pediatric nephrology	01 [JIPMER - Post-Doctoral Fellowship (PDF)]
Number of nephrology trainees	Total 08, Annually 03 or 02
Dialysis therapy technology (DTT) training programs	Graduate training in DTT is offered in 7 centers with a combined annual intake of 100 students
Centers with intervention nephrology facilities	06
Number of patients on dialysis	In-center HD: 1123 CAPD: 30 Home HD: Nil Hemodiafiltration: Nil
The current practice of HD	Frequency: twice weekly 90%, thrice weekly 10%
Proportion of patients with AVF as HD access	>90%
Proportion of patients undergoing HD under state-sponsored insurance schemes	90% (Less than 10% pay out-of-pocket)

JIPMER: Jawaharlal Institute of Postgraduate Medical Education & Research, DM: Doctor of Medicine, DrNB: Doctorate of National Board, HD: Hemodialysis, AVF: Arterio-Venous Fistula, CAPD:Continuous Ambulatory Peritoneal Dialysis

HLA Typing (in-house) is available at JIPMER. There are no institutions performing lymphocyte crossmatch (CDC and flow cytometry) in Puducherry, and all transplantation programs are dependent on the transplant immunology services in Chennai.

The State Organ and Tissue Transplant Organization (SOTTO) for Puducherry was established in the year 2019 at IGGGH & PGI and Dr. K. Kumar is the current state coordinator. The deceased donor organ procurement transplantation program is active in the public sector (JIPMER & IGGGH & PGI) and the private sector (Mahatma Gandhi Medical College & Research Institute, Puducherry). SOTTO has framed rules for deceased donor organ allocation for Puducherry. The deceased donor organ donation rate for Puducherry in 2023 was 4.38 persons per million, which has remained higher than the national average since the program's inception in 2013.

Puducherry has implemented the Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (PMJAY), under which families below the poverty line are provided health insurance by the government. Most of the dialysis centers in Puducherry are empaneled under the PMJAY scheme. Some dialysis centers in Puducherry are also empaneled under the health insurance scheme offered by the government of Tamil Nadu (CMCHIS). Under both state insurance schemes, underprivileged patients are provided medical treatment, including dialysis (HD & PD), vascular access placement, and kidney transplantation, without out-of-pocket expenses. Dialysis is free even to patients who are not beneficiaries of state-sponsored insurance programs by the three government institutions in Puducherry (IGGGH&PGI, IGMC, and JIPMER) and the government hospitals in Karaikal and Mahe regions.

The other three districts of the UT have less access to nephrology services. Karaikal and Mahe have hemodialysis facilities in the public and private sectors. Yanam does not have a dialysis facility, but a 10-bed hemodialysis unit is expected to be commissioned in 2024. Qualified full-time nephrologists and transplantation services are available only in the Puducherry region.

### Research activities and community engagement

In 2017, a hospital-based renal registry was established at JIPMER using a research grant from the International Society of Nephrology under the Sister Renal Centre program. This registry collects data on all newly diagnosed chronic kidney disease (CKD) patients, kidney biopsies, kidney transplant recipients, and living kidney donors. There is no dialysis registry in Puducherry.

The JIPMER CKD registry has been instrumental in identifying the high incidence of CKD of unknown etiology (CKDu) in the region. Eventually, it led to the reporting of the endemic nature of CKDu in the coastal districts of Tamil Nadu and Puducherry (Tondaimandalam Nephropathy).<sup>3</sup> JIPMER is involved in various investigator-

initiated multicentric research projects focusing on the progression and outcomes of CKD (the ICKD study), spectrum and outcomes of glomerular diseases (iTangible), and the development of an India-specific eGFR equation.<sup>4</sup> In addition, JIPMER is conducting research on acute kidney injury (AKI), including epidemiology, the role of biomarkers in diagnosis and prognosis, long-term outcomes and specifically on snake envenomation-related AKI and kidney transplantation.<sup>5</sup> Many institutions in Puducherry are part of ongoing multicentric drug trials.

Pondicherry Kidney Foundation, a public charitable foundation, was founded in 2003 by Dr. K Narayanan to provide financial assistance and subsidized dialysis. Private institutions also participate in community programs by organizing free screening and treatment camps.

### What can be improved?

While almost all nephrology clinical services and training opportunities are available in Puducherry, a glaring gap is the lack of transplant immunology services. There is a need for more interventional nephrology services and a more efficient renal pathology service. Puducherry has the potential to increase the deceased donor organ donation rates. Establishing a dialysis and kidney transplantation registry will be a significant step toward improving end-stage renal disease services in Puducherry.

### Conclusion

Puducherry has a rich legacy of medical education and provision of well-equipped public health services that are accessible to all sections of society. Despite the geographical, administrative, and demographic disadvantages, Puducherry offers comprehensive nephrology clinical services, an active deceased donor organ procurement program, and excellent opportunities for training in nephrology, dialysis technology, and renal pathology.

### Conflicts of interest

There are no conflicts of interest.

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