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Dizertační práce

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Vliv paliativního nemocničního týmu na finanční nákladnost a kvalitu péče o pacienty v závěru života.

Impact of a hospital palliative care team on costs and quality of care of patients at the end of life.

Školitel: **Prof. MUDr. Ivan Rychlík, CSc., FASN, FERA**

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Summary

This dissertation thesis describes the end-of-life care in hospital setting and compare the dying phase with and without specialist palliative care support. The second part of the thesis focus on quality of care improvement by using patient reported outcome measures (PROMS). To increase the quality of symptom assessment in palliative care the routine use of PROMS is recommended.

Aims The first study aimed to compare costs of terminal hospitalization and quality of care between the group of patients with and without support of a palliative care team. The second study aimed to provide translation, cultural adaptation and validation of IPOS-renal measure, which is patient reported outcome measure used for patients with advanced chronic renal disease.

Methods The first study was a descriptive retrospective case-control study. We explored the difference in daily hospital costs between patients who died with and without the support of the hospital palliative care team. As secondary outcomes, we compared the groups over the duration of the terminal hospitalization, intensive care unit days, intravenous antibiotics, MR/CT scans, oncologic treatment, preferences and limitation of care and family support. In the second study the IPOS-renal was translated to Czech and culturally adapted using cognitive interviews. During the validation phase, internal consistency was tested with Cronbach's alpha, its reliability via intraclass correlation coefficient. Convergent validity was tested with Spearman correlation to Kidney Disease Quality of Life Survey-Short Form 1.2.

Results In the first study we showed that the average daily costs were three times lower in the palliative group (4392.4 CZK per day = 171.3 EUR) than in the nonpalliative group (13992.8 CZK per day = 545.8 EUR), and the difference was probably associated with the shorter time spent in the ICU (16% vs. 33% of hospital days). In the second study Cronbach's alpha was 0.72 for internal consistency and the intraclass correlation was 0.84 for test-retest reliability and 0.73 for interrater reliability. The IPOS-r correlated with KDQOL-SF 1.2 and had a rho between 0.4-0.8 for most of the IPOS-r items, showing good convergent validity.

Conclusion We showed that the integration of the palliative care team in the dying phase can be cost saving in the first study. In the second study we proved the Czech IPOS-renal is a valid and reliable tool and we recommend it’s use in clinical practice.

Souhrn

Tato disertační práce srovnává péči v závěru života v nemocnici při zapojení paliativní péče a bez ní. Druhá část práce se zaměřuje na zlepšení kvality života nemocných používáním nástrojů s využitím pacientem reportovaných dat. Používání těchto nástrojů je doporučováno k rutinnímu klinickému hodnocení obtíží pacienta.

Cíl Cílem první studie je srovnání kvality péče a nákladovosti terminální hospitalizace při zapojení paliativní péče a bez ní. Cílem druhé studie je provést překlad, kulturní adaptaci a validaci nástroje IPOS-renal, co je nástroj používaný k reportování potíží pacientů s pokročilým chronickým onemocněním ledvin.

Metodika První studie byla deskriptivní studií případů a kontrol. Sledovali jsme rozdíl v denních hospitalizačních nákladech mezi skupinou pacientů zemřelých bez paliativní intervence a s ní. Jako sekundární výsledky jsme srovnávali skupiny v trvání hospitalizace, v dnech strávených v intenzivní péči, užití intravenózních antibiotik, CT/MR vyšetření, onkologické léčby, dokumentaci preferencí a limitace péče a podpory rodin umírajících. V druhé studii jsme přeložili IPOS-renal do češtiny a kulturně ho adaptovali s použitím kognitivního testování. V průběhu validační studie jsme testovali vnitřní konzistenci použitím Cronbach's alpha koeficientu, spolehlivost použitím intraclass korelačního koeficientu. Konvergentní validitu jsme testovali korelací na zlatý standard v nefrologii, dotazník Kidney Disease Quality of Life.

Výsledky V první studii jsme ukázali, že průměrné denní náklady jsou při integraci paliativní péče třikrát nižší (4392,4 Kč za den = 171,3 EUR) než bez integrace paliativní péče (13992,8 Kč za den = 545,8 EUR) a rozdíl byl pravděpodobně způsoben nižším počtem dnů strávených v intenzivní péči (16% vs. 33% hospitalizačních dnů). V druhé studii validace IPOS-renal činil Cronbach's alpha 0,72 pro vnitřní konzistenci, intraclass koeficient 0,84 pro test-retest spolehlivost a 0,73 pro spolehlivost mezi různými hodnotiteli. Korelační koeficient mezi IPOS-renal a KDQOL-SF 1,2 byl mezi 0,4-0,8 pro většinu dotazníkových otázek a tím byla prokázaná dobrá konvergentní validita.

Shrnutí: V první studii jsme prokázali, že integrace paliativní péče v závěru života v nemocnici šetří nemalé finanční prostředky. V druhé studii jsme prokázali, že česká verze IPOS renal je validním a spolehlivým nástrojem a doporučujeme ho používat v klinické praxi k hodnocení symptomů u nemocných s pokročilým onemocněním ledvin.

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1. Introduction

The main topic of this dissertation thesis is a description of hospital palliative care in the Czech Republic and identification of clinical and economic benefits of integration of specialist palliative care in a hospital setting.

Palliative care has evolved over the last few decades from a philosophy of care for dying patients to a professional discipline with expertise in symptom management, psychosocial and spiritual care, caregiver support, patient-clinician communication, complex decision-making, and end-of-life care. (Jacobsen,2011) Hospital palliative care is a novel service in the Czech Republic. First hospital palliative care teams were founded in 2017 and were inspired by similar services in western Europe, mainly in the United Kingdom, Belgium and Germany. A pilot project of Ministry of Health about implementation of palliative care in hospitals tried to describe benefits of hospital palliative care teams in seven Czech hospitals and it was run between 2019 and 2022. The complex data about interventions of the team members and about their effects on patient’s disease trajectory in the health system were collected and evaluated by the Institute of Health Information and Statistics of the Czech Republic, but they have not been published yet. There are many benefits of palliative approach for people with advanced disease described in literature (Temel,2011; Zimmermann,2014; Hannon,2016; Barkitas,2009) and research studies. Many medical associations recommend integration of specialist palliative care early in the disease trajectory and shortly after diagnosis of incurable disease. (Kaasa,2018; Ferrell,2017; Vanbutsele,2020; Ramchandran,2015)
This thesis focusses mainly on end of life hospital care, because more than 60% of all deaths in the Czech Republic occur in an acute hospital setting according to national data of Institute of Health Information and Statistics of the Czech Republic. (Švancara,2022)

According to many foreign studies, integration of palliative care in hospital can improve symptom management, promote quality of life, help patients with better understanding of their situation, and ensure that medical care is provided according to patient's preferences. It can also promote satisfaction of the patients and their families with health care. (Ramchandran,2015; Gaertner,2017; Houska,2019; Hearn,1998; Higginson,2002; Zimmermann,2008)

During the literature review I identified the gaps in research.
a) There are not any data published about the complexity of the dying phase in the Czech hospitals.
b) There are not any Czech studies comparing the end of life phase with and without integration of specialist palliative care.
c) There are no data about the costs of the terminal hospitalization in the Czech Republic.
d) There is no validated Czech patient-reported outcome measure available for the patients with advanced kidney disease.

In theoretical part I shortly describe basis, terms and principles of palliative care and indication of specialist palliative care.

In a practical part, I try to answer following research questions:
1/ Does a hospital palliative care team have any influence on the quality of care during the dying phase?

2/ What are the benefits of specialist hospital palliative for patients and their family during the dying phase?

3/ Does specialist palliative care have any influence on the costs of the terminal hospitalization?

4/ Can we get a valid outcome measure for the palliative renal patients by translation, cultural adaptation, and validation of the English measure called Integrated palliative outcome scale-renal?

In the practical part, I have conducted two research projects.

The first one was a retrospective case-control study called **Dying matters.** The study was focused on a description of economical aspects and quality of care provided in the end of life and potential benefits of a hospital palliative care team in the setting of the tertiary university hospital. According to international recommendations, quality of care and symptom burden of patients with advanced disease should be assessed by validated patient reported outcome measures (PROMS) and it is feasible to use PROMS also in a very advanced disease. (Clapham,2021; Sørensen,2022; Kane,2017; Higginson,2012) There is only one PROM validated in the Czech Republic for palliative care population, and it is called Integrated Palliative Oucome Scale (IPOS). (Vlčková,2020) As it was validated mainly on patients with oncologic diseases, it is not appropriate for patients with nononcologic diagnosis. Patients with renal failure are the most complex and they bear many unmet needs, (Mechler,2019; Combs,2015; Cohen,2006)

In the second project, I provided translation, cultural adaptation and validation of another PROM called Integration Palliative Outcome Scale-renal (IPOS-r) to improve symptoms assesment and quality of life of the patients with renal failure. (Křemenová,2022)

Process of translation, cultural adaptation and validation of this measure and it’s psychometric properties are described in the last part of this thesis.

THEORETICAL PART

2. Principles, definitions and historical context of palliative care in the Czech Republic

2a. Definition and principles of palliative care

Palliative care is an approach that improves the quality of life of patients (adults and children) and their families who are facing problems associated with life-threatening illness. It prevents and relieves suffering through the early identification, correct assessment and treatment of pain and other problems, physical, psycho-social and spiritual. (WHO,2020)
Palliative care is provided by a specially-trained team of doctors, nurses and other specialists who work together with a patients and other professionals to provide complex care. Palliative care is based on the needs of the patient, not on the patient's prognosis. It is appropriate at any age and at any stage of a serious illness, and it can be provided along with curative treatment.

WHO in it's official documents support early integration of palliative care to health care and provide practical approaches and resources to support policy, strategy and practice. (WHO,2021)

Generalist palliative care means good clinical practice, which is provided by healthcare staff within the framework of their specialties. The basic palliative skills include early recognition of incurable disease, identification of the patient's needs, good symptom management and emphatic communication. Every healthcare worker should be able to provide generalist palliative care.

Specialist palliative care is active and multi-professional care which is provided by the team of healthcare workers, who are specially trained and educated. It is offered to the patients who have very complex physical, psycho-social or spiritual needs which exceeds the skills of generalist palliative care providers.

2b. History

The concept of holistic care of severely ill patients has long tradition in European context. In middle ages, there were monasteries with monks devoted to care of severely ill people. In 1842, Jeanne Garnier founded the women community in Lyon, who cared for the patients with incurable disease, the house devoted to care of the dying people was called hospice.

The founder of modern hospice movement is dame Cicely Saunders, who came with a concept of “total pain”. According to her concept, physical pain is inseparably joint with psychological, social and spiritual suffering. (Wood,2021) She founded the St.Christopher’s hospice in the UK, where the complex care of the dying patients was provided by multidisciplinary team. Home hospice care (sometimes called mobile hospice) developed afterwards especially in the USA and in the UK. In 1975 Dr. Balfour Mount founded the first palliative care department in Royal Victoria Hospital in Montreal, Canada. His concept of palliative care was based on hospice movement and holistic approach to the care of severely ill patients. This was also an integral part of special attitude in healthcare services. Special hospital palliative care consult teams and outpatients palliative care services were the latest forms of specialist palliative care services.

The first hospice in the Czech Republic was founded in 1995 by Dr. Marie Svatošová in Červený Kostelec. The first palliative care department was opened in 1992 in Babice nad Svitavou and the first home hospice Cesta domů in 2003 in Prague.

3. Indications and types of specialist palliative care

3.1. Screening for palliative care needs and indication of specialist palliative care

Step 1: Surprise question: Would I be surprised if this patient dies in one year?

If your answer is NO, I would not be surprised, you should do screening of general indicators of health status declining and think of integrating palliative care and creating a palliative care plan.

Surprise question have high sensitivity of 67% and specificity of 82,5% as was shown in recent systematic review. (Downar,2017) The surprise question had worse discrimination in patients with non-cancer illness (area under sROC curve 0.77) than in patients with cancer (area under sROC curve 0.83). The surprise question should not solely be seen as an indicator of prognoses of death but rather as an opportunity for renewed attention for quality of care and shared decision making by timely initiating advance care planning. (Van Lummel,2022)

Step 2: General indicators of health status decline in 6 months

a) Progressive weight loss (more then 10% in 6 months)

- Progressive functional status decline (decline in Karnofski index more than 30% in 6 months or decline in Activities of Daily Living (ADL) for more than 2 activities in 6 months)

- Progressive mental health decline (decline in Mini Mental State Examination of more than 5 in 6 months)

b) Loss of independence (decline of ADL under 20 or Karnofski index under 50% according to clinical examination and history)

c) Geriatric syndromes

- 2 and more persisting or recurring geriatric syndromes (falls, pressure sores, dysphagia, delirium, recurring infections)

d) Persisting symptoms

- 2 and more persisting symptoms, which are difficult to manage, measured by validated symptom scale (Edmonton Symptom Assessment Scale ESAS or

Integrated Palliative Outcome Scale IPOS) -pain, dyspnoea, fatigue, anorexia, anxiety, depression etc.

e) Psycho-social suffering

-sever psychological distress or severe malfunction of adaptation

- severe social frailty, when family and social situation was screened

f) Multimorbidity

- two and more chronic diseases from the specific indicators listed below

g) Increased needs of support and repeated hospitalizations

- two and more unplanned hospitalizations in the last 6 months

- increasing need of supporting home care services and personal assistance

h) Need for palliative care was identified by healthcare staff or family

Step 3: Specific indicators of severe chronic disease

a) Rapidly progressing oncologic disease (Ferrel,2017)

- tumor with metastasis

-decline in performance status or functional state (more than 50% time in bed means usually prognosis shorter than 3 months)

-refractory persisting symptoms, despite optimal pharmacotherapy

b) Heart failure with minimum of two criteria from the list (Bonares,2021)

-chronic heart failure NYHA III or IV

- patient is in the last year of life according to their clinicians estimation

- recurring hospitalizations for the heart failure in the last year

-high symptom burden despite optimal pharmacotherapy

- cardiorenal syndrome, persisting hyponatremia

-severe valve defect or coronary atherosclerosis, which can’t be surgically repaired

c) Chronic obstructive pulmonary disease (COPD) with minimum of two criteria from the list (Philip,2021)

- severe state of the disease (spirometry obstruction with forced expiratory volume in one second (FEV1) under 30% or severe restriction with vital capacity (VC) under 40% or diffuse lung CO capacity (DLCO) under 40%)

- recurring hospitalizations for the COPD in the last year (minimum of 3 in last 12 months)

-fulfill criteria for home oxygenotherapy

- dyspnoe after 100m walking or during common home activities

- signs of secondary right heart failure

- combination with other negative prognostic factors (infections with multiresistant bacteria, anorexia, cachexia)

- more than 6 weeks of systemic corticotherapy for COPD in the last 6 months

d) chronic kidney disease CKD 4 or 5 with minimum of two criteria from the list (McKeown,2008; Ducharlet,2021)

-surprise question applicable

- refused kidney transplant, decision about withholding or withdrawing dialysis

-sever physical or psychological symptoms despite optimal pharmacotherapy or renal replacement therapy

- symptomatic renal failure with nauzea, vomiting, anorexia, pruritus, functional decline, hyperhydration

-cardiorenal syndrom

e) liver disease (Low,2017)

- advanced liver cirhosis (Child-Pugh C, Model for End-Stage Liver Disease- MELD score over 30)

- ascites despite diuretic treatment, spontaneous bacterial peritonitis, hepatorenal syndrome

- APTT more then 5s over norm

- encefalopathy

- recurrent bleeding from oeasohageal varices

f) neurological diseases (McConvey,2022)

- progressive decline in physical, functional and cognitive functions

- complex and not fully controlled symptoms despite optimal pharmacotherapy

- swallowing problems, recurring pneumonias with respiratory insuficiency and dyspnoea

- increasing problems with communication

g) motoneuron diseases

- rapid functional decline

- first episode of aspiration pneumonia

- rapid cognitive decline

- weight loss

- complex syndromes and severe medical complications

- low vital capacity (VC below 70% measured by spirometry)

- dyskinesis, falls, walking problems

- speech problems

h) Parkinson disease (Richfield,2013)

- lower effect of antiparkinson drugs

- assistance needed in daily living

- deconditioning

- dyskinezia, immobility, falls

- psychiatric problems (anxiety, depression, hallucination, psychosis)

- frailty symptoms

i) Multiple sclerosis

- severe and complex medical complications and symptoms

- dysphagia, problems with nutrition

- communication problems

- declining in cognitive health

j) Frailty, dementia, strokes (Mo,2021)

Frailty

- functional decline (Eastern Cooperative Oncology Group score-ECOG/ADL/Karnofsky score decrease)

- combination of min. 3 symptoms from the list below:

- weakness

- slow walking

- weight loss

- exhaustion

- low physical activity

- depression

Stroke

- severe problem with consciousness or persistent vegetative state

- recurrent medical complications (severe infections, urinary infections, pneumonias)

- not improving in next 3 months after stroke

- cognitive impairment or dementia

Dementia

- unable to walk without help

- incontinence of stools or urine

- not valid communication

- unable to provide common activities of daily living (ADL)

Plus one of the symptoms listed below:

- weight loss

- lower oral intake

- urinary infections, pneumonias

- pressure sores

- recurring fevers

In dementia, advance care planning and discussion about preferences are crucial early enough, so they can participate and state their wishes for future care until they have mental capacity for decision making.

When answering NO, I wouldn’t be surprised if this patient die in next year, we are in specific clinical situation. The patient need palliative care to be integrated, holistic care should be focused on quality of life improvement and planning for future.

Good clinical practice when caring for people with specific palliative care needs include:

- emphatic and truthful communication about the estimated disease trajectory

- setting of real goals of care and palliative care plan based on patient‘s withes and values

- inform other health specialists

- determine the power of attorney in case the patient lose decision making capacity

- include relevant professionals to alleviate physical, psychological, spiritual or existential suffering

- provide patients and their families with relevant information

- the palliative care plan should be written in medical records

3.2. Palliative care services in the Czech Republic

If the patient is too complex the provider with multidisciplinary team and expertise in specialist palliative care should be invited to take part in the patient's care. There are several forms of specialist palliative care in the Czech Republic:

-hospital palliative care consult team-address patients needs in the hospital, while they are treated for their problems in the other ward

-palliative care outpatient clinic – outpatient service specialized in management of complex patients with perceived mobility, who can attend the service regularly from home

-hospice- takes care of the dying patients with prognosis less than several months, who can’t be cared for at home by their family

-home hospice- multidisciplinary team who take care of dying patients with prognosis of weeks at their homes, where family is a main informal carer

-hospital palliative care ward – special ward devoted to the care of complex palliative patients in the hospital. This service is rather rare and there aren‘t any payments from insurance companies set up for this service.

Patient indicated to specialist palliative care must fulfill all three criteria:

-they have active, progressive, incurable and life-limiting disease

-they have complex bio-psycho-socio-spiritual needs which exceed the abilities of primary care

-patient or their family agree with integration of specialist palliative care service

PRACTICAL PART

4. Dying matters study

The Dying matters study had two integrated parts - quantitative economic part and semi-qualitative part, which was focused on quality of care in the dying phase. The study was supported by the Technology Agency of the Czech Republic program ÉTA3 grant called Dying Matters [TL03000709].

This research project was performed in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Faculty Hospital Královské Vinohrady in Prague (number EK-VP/62/0/2019). All methods were performed in accordance with the approved study protocol and ethical guidelines.

In the economic part of the Dying matters study we developed our own methodology for economic evaluation of the dying phase and we compared end-of-life costs of patients who were supported by palliative care team and who were not.

The results of economic analysis were presented on XII Czech national palliative care conference in Plzeň in 2021 under the section „Original studies“ and the results were also published in the international peer-reviewed Journal of Palliative Medicine in 2022 (Kremenova, 2022)

In the quality of life part of the Dying matters study we assessed quality of care at the end of life. We compared several quality of care parameters, such as communication, integration patient’s preferences in decision making and limitations of care, and we also compared how family of dying patient was informed and supported by health care staff. The comparison was made between the two groups of patients who died in the tertiary university hospital, one with and the other without palliative care.

The results of the study were published in the Czech peer-reviewed journal Paliativní medicína in 2021. (Křemenová, 2021)

4.1. Background

Medical care in inpatient hospices and home hospices was proven cost effective by pilot projects of the Ministry of Health (Závadová,2018) and is paid by insurance companies, so they are widely available across the country. Hospital-based consult teams are quite new to the Czech Health System. The first hospital palliative care consultation teams were established in 2016 in Prague and play a leading role in implementing palliative care in Czech hospitals. The palliative care team of the Faculty Hospital Kraláovské Vinohrady in Prague is one such team. Although hospital palliative care teams are developing rapidly in the Czech Republic and most of them have got funding from insurance companies from 2021, some of them still provide their services with substantial grant support from private donors. Many Central and Eastern European countries face very similar problems, and data on the economic aspects of hospital-based palliative care are sparse in this region. (Hagemann,2020) Differences in funding mechanisms may, in fact, drive differences in the type of services, as well as the number of patients served and their disease trajectory. (Groeneveld,2017)

According to a regular public opinion survey conducted in the Czech Republic, 78% of Czech people want to die at home. The hospital is not a preferred place of death for most patients, but more than 50% of patients worldwide die in hospitals. In the Czech Republic, 60% of patients die in hospitals, long-term healthcare wards or hospices. Palliative care in hospitals can be provided in a dedicated palliative care unit or more commonly by a specialist palliative care consulting service. Patients are indicated to the palliative care when their symptom burden and needs are too complex to be managed by their primary team. Patients indicated to palliative care suffer mainly from cancer and patients dying from organ failure or frailty receive palliative care at far lower rates. (Seow, 2018) Medical and ethical dilemmas involving patients reaching the end of life arise as opportunities to maintain and prolong life in modern medicine increase. (Kyba,2002; Rainer,2018) Specific treatments and diagnostic procedures can be inappropriate and not beneficial to the dying patients. (Druml,2016) Intensified therapeutic and diagnostic procedures are sometimes performed during the dying phase despite their limited clinical value and the substantial healthcare costs. (Dasch,2021) According to some studies, the highest costs are in the dying phase. (May, 2018) Integration of palliative care in hospitals is associated with not only clinical but also economic benefits. (May,2015; Isenberg,2021; May,2019; Yadav,2020) According to the research studies in the United States, cost savings were largely driven by a significant difference in hospital readmission costs, reduction of emergency department visits, and reduced pharmacological costs. (Smith,2014) A study using National data from New Zealand found that patients in their last month of life were prescribed twice as much medication as age matched survivors, (Pont,2016) and specialist palliative care involvement was associated with lower medication costs. (Gaertner,2013; Hinkka,2001) For patients who died in hospital, palliative care consultation was associated with even higher cost savings than for those who were discharged. (Smith, 2014) The patients with a palliative care consultation in the intensive care unit (ICU) had reduced length of stay and lower costs when compared to those without the palliative care consultation; mortality between the two groups was not significantly different. (Kyeremanteng,2018) On the other hand, some high-quality studies failed to prove any significant difference in hospital costs between the groups with and without palliative care intervention. (Bajwah,2020; Brinkman-Stoppelenborg,2020) However, the applicability and generalizability of evidence is uncertain due to the small sample sizes, short duration, and limited modelling of costs and effects of these studies. Economic evaluations with larger sample sizes are needed, inclusive of the diversity and complexity of palliative care populations in different countries.

In the end-of-life (EoL) context, treating discomfort and alleviating suffering is the main goal of medical interventions. It is critical to soothe distressing physical symptoms and enable dying patients to meet their needs and fulfill their wishes. Spiritual and existential issues related to the meaning of one’s life play an important role and people may not raise these questions until their end is near. (Varelius,2019)

Understanding preferences and issues that are of the greatest importance for patients with life-threatening illnesses is very important for their loved ones. However, it is difficult for patients, families, and healthcare providers to initiate EoL conversations. (Li,2021) There is an assumption that physicians should lead the EoL communication. On the other hand, an interdisciplinary approach that involves nurses, social workers, and chaplains could significantly improve patient care.

(Nedjat-Maiem,2017) Discussing preferences regarding EoL issues is a challenging and important task for any physician. Discussiong patients‘ preferences allow the healthcare staff to provide the type of care concordant with patients‘ goals, avoid unwanted interventions, and promote patients’ autonomy and dignity. Although providers receive education regarding EoL communication and care coordination, there are certain barriers to effective communication about advance care planning. (Chittenden,2006) Clinicians rarely explicitly acknowledge that the patient has a serious illness that could lead to death. Medical culture is focused on cure and on warding off death until the last possible moment. Clinicians are concerned that patients will lose hope if they are too honest about their prognosis and acknowledge the inevitability of death. They also feel unprepared to address patients’ fears and to manage their feelings about patients’ death or help bereaved families. (Sullivan,2003) In many healthcare staff surveys respondents felt uncomfortable in providing palliative and EoL care and self-assessed competency in EoL communication was often rated as below-average. (Sanchez,2015) The review of literature reflects a fragmented and variable approach to palliative care education across different countries (Head,2016) with an emerging need for self-assessment of core competencies. (Montagnini, 2021) There is a great need to improve clinical education on how to deliver difficult news and how to initiate EoL discussions with seriously ill patients and their families. (Sutherland, 2019)

During the past decade, awareness of EoL care has increased, and the concepts related to palliative care have changed. Being free from pain and other distressing symptoms, not being a burden to one’s family, having loved ones around, and feeling that one’s life was meaningful have been rated as the core components of EoL care. However, patients’ EoL preferences vary significantly across different countries and cultures. There are also significant differences between patients, their families, and healthcare staff. (Li,2021; Supiano,2019; Patanupong,2021; Vig,2004; Kastbom,2017; Alexandrova-Yankulovska,2015; Yun,2018)

Maintaining autonomy at the EoL is not only about enabling patients to make active choices,but also to make informed decisions about treatment and care. (Houska, 2016) The choices that patients make depend on their prognostic awareness and their awareness that they are close to death. A small proportion of patients are aware of their prognosis. Prognostic awareness does not have to be associated with increased emotional distress for patients, which many clinicians fear and therefore tend to avoid or postpone prognostic disclosure. (Vlckova,2021) Requests for prognostic information are usually initiated by families in the majority of conversations. Clinicians respond using categorical time references such as 'days', thus providing prognostic estimates without giving precise time information. (Anderson, 2020)

The hospital is not a preferred place of death for most patients (Gomes,2012), but multimorbid elderly and seriously ill patients often die in acute care departments in hospitals. Pain and other symptoms are commonplace and troubling to patients. Despite family members' belief that patients prefer comfort, life-sustaining treatments are often introduced. (Lynn, 1997) The options available to maintain and prolong life in modern medicine give rise to medical and ethical dilemmas involving patients reaching the end of life. (Kyba,2002; Rainer,2018) Difficult questions arise regarding whether specific treatments and diagnostic procedures are appropriate and beneficial to these patients. (Druml, 2016; Courtright,2019) Incurably ill patients are often subject to non-palliative invasive interventions at the end of life. (Ahronheim, 1996)

Good communication and documentation of patients‘ preferences can help to state the limitation of life-sustaining treatment, prevent transfers to intensive care units (ICU) and save healthcare costs. (Kremenova, 2022)

4.2. Aims and objectives of the Dying matters study

In the Czech Republic, we are not aware of any study describing the complexity of the dying phase in hospitals, despite rapid palliative care development. Describing gaps in EoL care on country level can help to address educational activities to increase the quality of generalist palliative care, and improve patients centered outcomes.

The aim of our study was to describe the dying phase in the tertiary university hospital, not only quality of care and dying, but also patients' preferences and the healthcare costs.

Objective 1:

Our study aimed to determine whether integration of the hospital palliative care team at the end of life can prevent the use of burdensome diagnostic and therapeutic procedures and explore whether integration of hospital palliative care teams at the end of life can prevent transitions to intensive care and lower healthcare costs.

The difference in healthcare costs between the groups with and without a palliative care intervention was the primary outcome.

Objective 2:

The study also aimed to describe the EoL preferences of patients who died in the tertiary university hospital in Prague. We aimed to find out whether there were any differences in the documentation of EoL preferences between patients dying with and without the support of the hospital palliative care team.

Objective 3:

We wanted to find out how many patients had prognoses and limitations of life-sustaining treatments documented in their medical records, and whether there were any differences between patients dying with and without the support of the hospital palliative care team in these parameters. We explored if documentation of limitations of life-sustaining treatments, prognosis, and preferences can influence time spent in the ICU.

4.3.Methods

Design

We used a case-control observational retrospective study design with a mixed-methods approach. We retrospectively analyzed and documented data from paper and electronic medical records of terminal hospitalizations and bills to the insurance companies. In quality of care assessment we provided qualitative content analysis of medical records. The differences in the EoL care parameters between the two groups of patients with (palliative care group) and without (non-palliative care group) the support of the hospital palliative care team were compared.

Setting

The Faculty Hospital Kráovské Vinohrady is a tertiary university hospital in Prague with 1,200 beds, serving a catchment area of approximately 300,000 inhabitants.

The hospital’s palliative care team is one of the most developed teams in the Czech Republic and plays a leading role in the implementation and development of specialist hospital palliative care in the country. Nearly one-third of the patients indicated to the team die during their terminal hospitalization. There are approximately 1,100 deaths in the hospital per year, with 15-19% of dying patients supported by the palliative care team.

Participants

Sample size calculation in the “Dying Matters” study was made to prove a cost difference of 20% between groups with and without palliative care involvement with a 0.05 level of significance and power of 0.8. We used PS Power and Sample Size Calculations (version 3.0).

All 1581 inpatients who died between January 2019 and April 2020 were eligible for the study. A total of 213 patients were supported by the hospital palliative care team during the dying phase. They were matched with similar controls from all deceased patients who were not supported by the team. Routine data from the National Death Registry and National Registry of Hospital Activity were used for the matching. (ÚZIS,2016) Propensity score matching was used to control for variation in age group (decades), sex, Charlson comorbidity index, and diagnosis recorded on the death certificate.

Data collection

Data were collected from paper and electronic medical records. Three researchers, all physicians (two internists and one oncologist), analyzed the records of the deceased patients. Patient demographics, comorbidities, and primary diagnosis were extracted from death certificates and the Registry of Hospital Activity. The variables were inserted into a prepared template. When the qualitative data were analyzed, content analysis of the written data was carried out. In qualitative part we searched for the documentation of prognosis, preferences, dying phase description, family support, and time spent in the ICU. Economic data were collected from hospital bills to the insurance companies. Patients' preferences, prognosis, and limitation of life-sustaining treatments and the words used for the description of the dying phase were extracted and transcribed verbatim. Researchers inserted the variables into a prepared Excel table.

Variables

Calculation of the total daily costs of a terminal hospitalization and determination of their difference between the control and clinical group were the primary outcomes. There are standardized costs for each procedure in the insurance company's price list. The most exact estimate of the daily costs is possible by counting all the costs of diagnostic and therapeutic procedures documented in medical records (monetary value paid for the medical performance by insurance company) and adding all prices of separately charged drugs and materials.

The secondary outcomes were the length of the terminal hospitalization, days in the ICU, the use of intravenous (IV) antibiotics, chemotherapy and radiotherapy in the last month, and the number of costly diagnostic procedures [Computerized Tomography (CT)/Magnetic Resonance Imaging (MRI) scans].

Demographic parameters and frequency of categorical variables were described using common descriptive statistics.

When the semi-qualitative data (documentation of dying phase) were analyzed, content analysis of the written data was carried out according to a mechanism on which a consensus was reached by all researchers and the project manager. Approved words and phrases used for dying phase documentation were “dying patient”, “terminal phase”, “terminal disease”, “patient with a prognosis of hours/days”, “infaust prognosis”, “patient at the end of life” and “patient ante finem”.

Patients' preferences were grouped into bigger themes with similar meanings. The research team held regular meetings to unify the way of prognosis and limitation of life-sustaining treatments assessment. The prognosis was documented and YES inserted into the table when the exact time frame was found in medical records (prognosis of hours, days, weeks, etc.). Limitation of life-sustaining treatment was documented and YES inserted into the table when exact medical interventions were named not to be provided in the future. (no dialysis, do not resuscitate, do not intubate, etc.)

Data analysis

The geometric mean and logarithmic transformation of hospital costs were used for power analysis and sample size calculation because of the asymmetric distribution of the data. We used the average terminal hospitalization costs of 50,000.00 CZK (1960 EUR) for power analysis calculations.

A total of 195 patients in each group were needed to demonstrate a cost difference of 20% (10,000.00 CZK = 392 EUR) between the groups with a significance level of 0.05 and a power of 0.8. We used the PS: Power and Sample Size Calculations (version 3.0).

Standard descriptive statistics were used to describe the data. Numerical variables were described using the mean, standard deviation, and 95% confidence interval. Categorical variables were described using absolute and relative frequencies of categories (percentages).

The statistical significance of differences between the clinical and control groups was tested by Fisher's exact test for categorical variables and the Mann-Whitney U test for numerical data.

The results were considered statistically significant at the level of alpha <0.05 in all applied analyses. Analyses were performed using IBM SPSS Statistics 25.0.0 (IBM Corporation, 2017).

4.4 Results

4.4.1 Participants

All 213 decedents who received the support of the palliative care team in the measured period and 213 controls out of a total of 1581 decedents were included in the study (see their demographics in the Table 1). Most of them had a main oncological diagnosis reported on their death certificates (Table 1). All participants died during the study period from January 2019 to April 2020. They were mostly elderly, with a higher number of comorbidities. (Table 1). The length of hospitalization in the group with and without palliative care is described in the Table 2.

Table 1 Participants characteristics

		Palliative team intervention	
		Yes (n=213)	No (n=213)
Sex	Female	47.9% (n = 102)	47.9% (n = 102)
	Male	52.1% (n = 111)	52.1% (n = 111)
Comorbidities (mean)		4,08	4,13
Mean age (yrs)		77,12	78,83
Oncologic diagnosis	Yes	173 (81.2%)	174 (81.7%)
	No	40 (18.8%)	39 (18.3%)

Table 2 Length of hospitalization

	Days	Palliative care group (n=213)	Non-palliative care group (n= 213)
Length of hospitalization	< 3	9.9% (n = 21)	34.3% (n = 73)
	3 to 7	33.8% (n = 72)	32.9% (n = 70)
	8 to 30	50.7% (n = 108)	25.8% (n = 55)
	> 30	5.6% (n = 12)	7.0% (n = 15)

4.4.2 Costs and the group differences

We calculated all the costs of terminal hospitalization, which was the primary outcome of the study. There was no significant difference between groups in the total costs due to the nonparametric distribution of cost values, with the majority of them around the mean. On the other hand, 73 outliers (17%) had hospital costs exceeding double the mean value. More outliers (47 patients, 64%) with extremely expensive hospitalizations were in the nonpalliative group (Figure 1). The average daily costs were three times lower in the palliative care group (4,392 CZK = 171 EUR per day) than in the nonpalliative care group (13,992 CZK = 545 EUR per day, p≤0.001), and there was a significant difference in the daily hospital costs exceeding 10,000.0 CZK (p≤0.001) (Table 3, Figure 2).

Chemotherapy and radiotherapy in the last month of life were used similarly, without any significant differences between the cases and controls (Table 4). We also did not observe any significant differences in IV antibiotic use. The use of diagnostic MRI and CT scans was also similar, with no significant differences. (Table 3)

Figure 1 Total costs per hospital stay

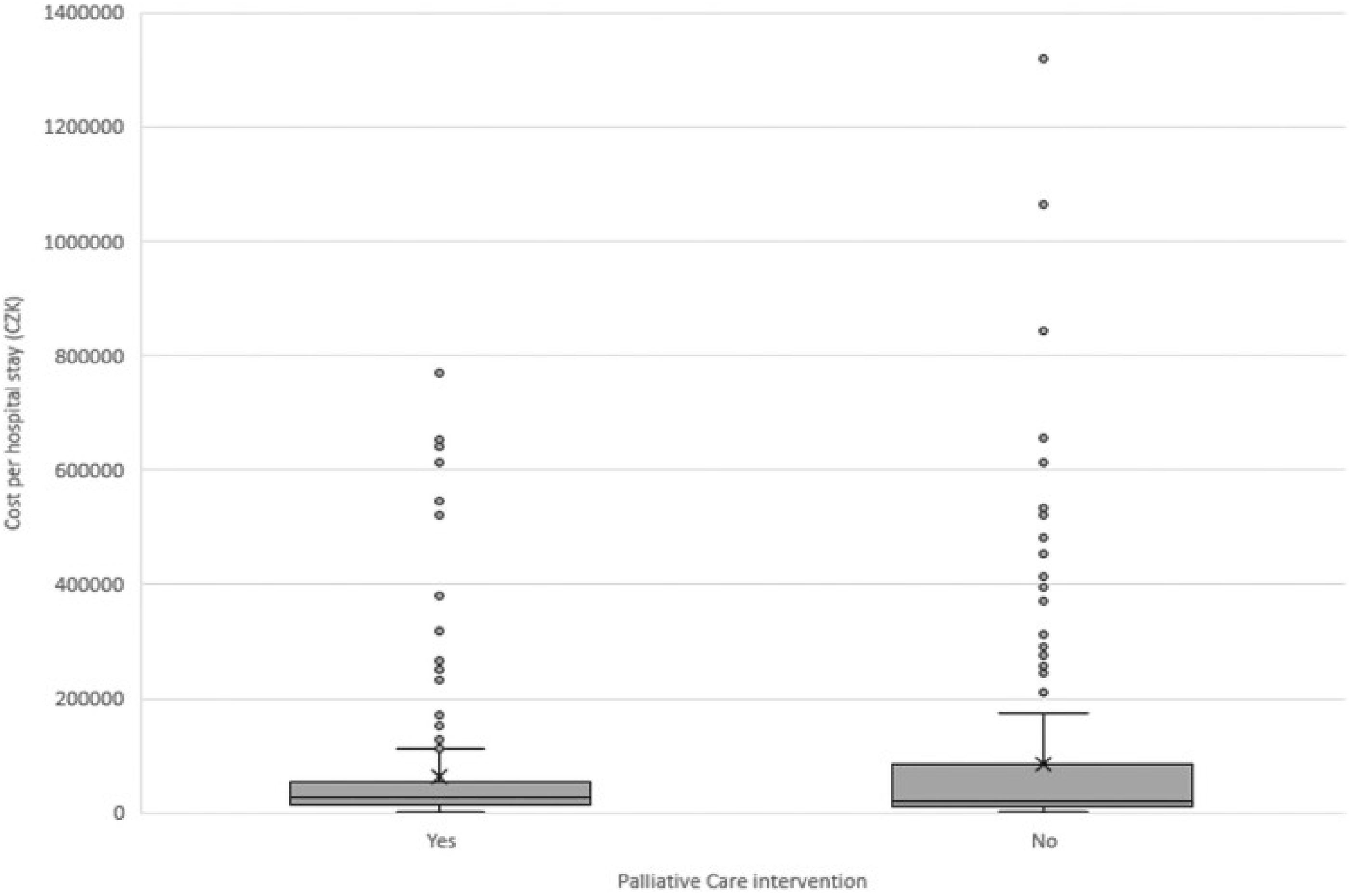
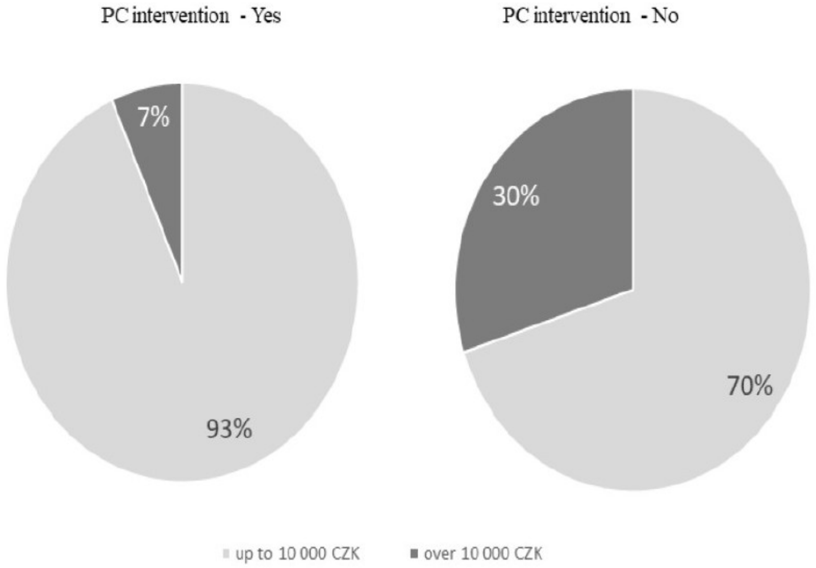


Table 3 Healthcare costs and costly interventions

	Palliative team intervention					
	Yes (n = 213)			No (n = 213)		
	Mean	Standard deviation	95% CI	Mean	Standard deviation	95% CI
Daily costs (CZK)	4,392	4,419	3,795-4,989	13,322	32,992	8,866-17,779
Total costs (CZK)	64,754	124,046	47,999-81,508	85,617	168,254	62,891-108,342

Length of hospitalization	14.27	31.43	10.03-18.52	18.37	77.52	7.90-28.84
Daily doses of IV antibiotics	I.91	1.88	1.65-2.16	I.78	2.17	1.49-2.08
Rate of ICU days (ICU days/total days of terminal hospitalization)	0.16	0.31	0.12-0.20	0.33	0.44	0.27-0.39
CT or MRI scans (number of scans/maximal number of scans in the group)	0.46	0.85	0.35-0.58	0.60	0.96	0.47-0.73

Figure 2. Daily hospital costs



Statistical significance was tested by the Fisher exact test (p<0,001)

Table 4 Oncologic treatment in the last month and documentation of the dying phase

		Palliative team intervention		p
		Yes (n=213)	No (n=213)	
Chemotherapy in the last month	Yes	3.3% (n = 7)	6.6% (n = 14)	0.178
Radiotherapy in the last month	Yes	2.8% (n = 6)	4.2% (n = 9)	0.601
Dying documented in the medical records	Yes	62.4% (n = 133)	30.5% (n = 65)	<0.001

4.4.3 Hospitalization

We demonstrated a significant difference in the length of terminal hospitalization between the groups. Integration of the palliative care team was associated with significantly shorter terminal hospitalizations (mean=14.3 days in the palliative care group vs 18.4 in the non-palliative care group, p≤0.001). (Tables 2 and 3)

Patients who received palliative care interventions spent significantly less time in the intensive care unit (16% of the hospital days in the palliative care group vs. 33% in the nonpalliative care group, p≤0.001). (Table 3)

4.4.4 Documentation of the dying phase

Twice as many patients in the palliative care group (62.4%) had the fact they were dying documented in their medical records compared to the non-palliative care group (30.5%) and the difference was statistically significant. (p<0.001, Table 4) Patients, whose dying phase was documented in medical records, had more palliative care interventions. (p<0.001) The dying phase was documented using different words. (Figure 3, Table 5)

Fig 3 Words used for documentation of the dying phase (188 patients)

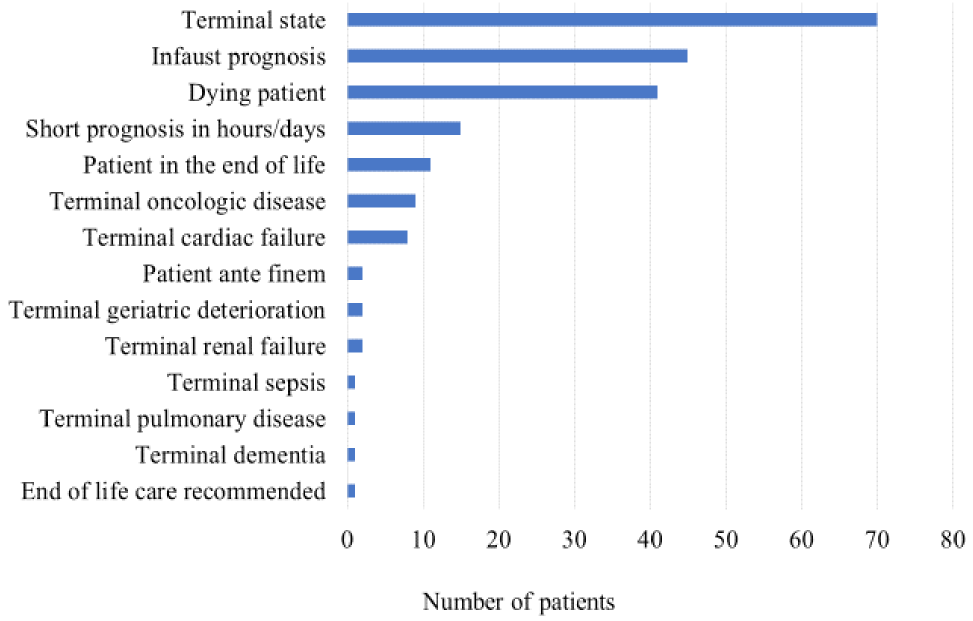


Table 5 Differences in the documentation of preferences, prognosis, limitation of life-sustaining treatments, and family support (tested by Fischer's exact test).

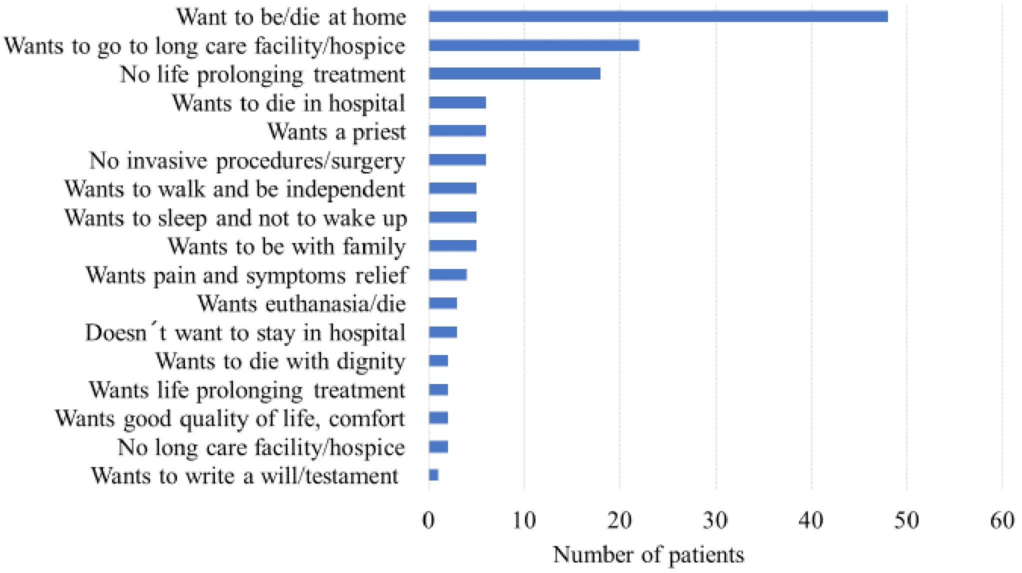
Documentation		Palliative care	Non-palliative care	P-value
		213 patients (%)	213 patients (%)	
Dying phase	Yes	62.4	30.5	<0.001
Preferences	Yes	49.3	3.3	<0.001
Prognosis	Yes	37	3.7	<0.001
Limitation of life-sustaining treatments	Yes	66.6	34.7	<0.001
Family support	Yes	83.5	13.1	<0.001

4.4.5 Documentation of patients´ preferences

The difference in the documentation of preferences between the palliative care and the non-palliative care group was the most significant. Patients had their preferences documented fifteen times more often in the palliative care group (49.3%) than in the non-palliative care group (3.3%) and the difference was statistically significant. (p<0.001) The most prevalent preferences were to be or die at home, to be or die in a hospice or long-term facility, and not to undergo any life-prolonging treatments. (Table 5, Figure 4)

Patients, where preferences were documented in medical records, had more palliative care interventions. (p<0.001)

Fig 4 End of life preferences (113 patients)



4.4.6 Documentation of patient´s prognosis

The palliative care group had a prognosis documented ten times more often (37.0%) than the non-palliative care group (3.7%) and the difference was statistically significant. (p<0.001, Table 5) Patients, where prognosis was documented in medical records, had more palliative care interventions. There wasn't any significant difference between the groups with and without prognosis documented depending on sex (p=0.323), number of comorbidities (p=0.196), and main diagnosis. (p=0.054)

4.4.7 Limitation of life-sustaining treatments

Almost twice as many patients in the palliative care group (66.6%) than in the non-palliative care group (34.7%) had written in their medical records that some invasive medical procedures wouldn’t be performed in the future (Table 5) and the difference was statistically significant. (p<0.001) Patients, where life-sustaining treatments were limited, had more palliative care interventions. (p<0.001) There was a significant difference in limitation of care depending on the main diagnosis and the patients with oncologic diagnoses had limitation of care more often documented. (p=0.001) The limitation was not dependent on sex (p=0.561) nor on the number of comorbidities. (p=0.807)

4.4.8 Documentation of family support

We know that dying patients and their loved ones should be supported by healthcare providers. This support was documented six times more often in the palliative care group (83.5%) than in the control non-palliative care group (13.1%) and the difference was statistically significant. (p<0.001, Table 5) Patients whose family was supported by healthcare staff had more palliative care interventions. (p<0.001)

4.5 Discussion

Main findings

This study shows that the integration of the hospital palliative care team during the dying phase has the potential to reduce healthcare costs. The daily costs were three times lower in patients supported by the palliative care team. The cost savings were associated with a lower number of extremely expensive hospitalizations and fewer days spent in the ICU in the palliative care group compared to their matched controls.

This study also shows that integration of the hospital palliative care team during the dying phase can have some benefits and can bring improvement of the quality of care. Twice as many patients in the palliative care group had the dying phase documented in their medical records compared to the non-palliative care group. This may be caused by the fact that end-of-life discussions are not a common part of the Czech culture and are taboo, but they are the standard part of a palliative care consultation. Patients in the palliative care group had prognoses documented in medical records more often than patients from the control group. This can change the context of care not only for these patients but also for their families and healthcare staff. Knowing prognosis could have had a significant influence on preferences and advance care planning..

Significantly more dying patients had their EoL preferences discussed and documented in medical records including their preferences for invasive medical interventions and limitation of life-sustaining treatments. This could have been the reason for fewer days spent in the ICU in the palliative care group compared to their matched controls. What’s more, patients with knowledge of their prognosis could prepare better for their end of life and manage their financial and personal issues.

This is a very difficult period for patients‘ families and most of them need substantial support from healthcare staff. If the palliative care team is included it can be beneficial not only for the patients but also for their family as they are supported by the staff six times more often in the palliative care group.

Strengths and limitations

To our knowledge, this is the first study to examine the complexity of the dying phase in the hospital setting in the Czech Republic.

This is also the first study to examine cost savings related to hospital palliative care interventions not only in the Czech Republic, but also in the Central and Eastern European regions. The large sample size (n=213) increased the strength of the results.

Significant differences between the groups in all study variables were reached. Patients of different age groups, cancer types, and noncancer diagnoses were included, and they were properly matched using routine national data from registries and propensity scores; therefore the biases should have been reduced to a minimum.

There are also several limitations to this study. The one-center study has limited external validity. Additionally, including just dying patients could have been a source of measurement bias. The retrospective study design limits the richness of data; especially in the dying phase documentation, if death was not documented in the records, it does not imply that it was not discussed with the patients and staff. The semi-qualitative assessment of the dying phase in medical records and the words used to describe the dying process could have been biased by the researchers. We organized monthly meetings of all three researchers and the project leader to clarify discrepancies and approve a unified method of data collection and content analysis.

Statistical significance of the results can be also influenced by the level of general palliative care; countries with higher levels of general palliative care would probably prove less significant differences.

Implications for practice

Financial resources can be a significant barrier to the development of palliative care not only in the Czech Republic, but also in many other countries. The supporting evidence that hospital palliative care can be cost saving and lower the number of ICU days in the dying phase and number of patients with expensive end-of-life hospitalizations can help when advocating and negotiating with stakeholders. It can promote the integration of palliative care in hospitals in middle- and low-income countries.

The complex assessment of the dying phase reported in this study can be a piece of supporting evidence that hospital palliative care teams may help to provide better patient-centered care. Better communication and documentation can help to clarify the context of care and patients’ priorities. Limitation of life-sustaining treatments is connected with more patient-centered care and can prevent unwanted and futile invasive treatments and transfers to the ICU.

The study results in the Czech Republic should lead to educational and systemic changes to improve the quality of generalist palliative care in the country and to assure good quality EoL care for every patient. The supporting evidence that hospital palliative care is associated with lower utilization of intensive care and potential cost savings can help when advocating and negotiating with stakeholders about payment of this service, which strongly depends on grant financial support and is not yet fully paid by insurance companies in all Czech hospitals.

As a result of the Dying matters study, we prepared and published online the Methodology of the comparative analysis of the costs in dying phase in hospital setting (Křemenová, 2021)

Here I provide a step by step description of the analysis and comparison of the costs in dying phase between the two groups: one with and the other without the palliative care team involvement. This approach is now used in 4 other Czech hospitals in DECAREL study and the summary results will be analysed and published this year.

1) In the first step, we identified all patients who died with support of the hospital palliative care team (intervention group) between 1/2019 and 4/2020 .

2) We matched them to the control group of the deceased without palliative care involvement.

The matching was provided by Institute of health information and statistics (ÚZIS). The form called „Požadavek na export dat z Národního zdravotnického informačního systému (NZIS)" must have been sent to them before the matching.

Here is the specification of the request: Based on the Death certificates and The national registry of hospitalization we ask you to provide us with a control group (patients who died in the Faculty hospital Královské Vinohrady without the palliative team support) matched to the intervention group (patients who died in the Faculty hospital Královské Vinohrady with the palliative team support). The two groups should be matched by age, gender, diagnoses in the death certificate and comorbidity index.

3) The economic analysis was provided as follows (Ing.Králová, petra.kralova1@fnkv.cz):

The input for the analysis is a file with matched identification birth numbers.

The present IR-DRG coding system is not suitable for the analysis because:

1. despite we have patients with similar health problems and diagnoses, the hospital cases are distributed according to critical health executions and diagnoses, so the case of the patient in palliative care could be classified in other DRG group, despite the very similar type of hospitalization.
2. despite the patients are distributed to the same DRG groups, they can differ in laboratory examinations, imaging methods etc.

Because of the previously mentioned reasons, we analyzed the costs based on health executions, laboratory and imagining methods, which offer the most precise estimation of the healthcare costs. Health executions are connected with separately billed items (ZUP), which can provide even more specific information for the comparative analysis. On the other hand this method have also some limitations as it is dependent on the precision of the doctors and coders, who input the data about health executions and separately billed items (ZUP) to the hospital information system (NIS). Despite some limitations, we don‘t have more effective way, how to measure costs retrospectively.

In the first part, we extracted health executions and separately billed items from the NIS.

In the FNKV the hospital information system is called UNIS, so our guidelines are described using procedures in this NIS. In the second part we describe the comparatory analysis of the economical data extracted from the NIS and matching them to the birth numbers.

Used software:

Database tool Paradox- data extraction and management

MS Office Excel – comparative of the data and matching them to the birth numbers

Please be careful, the guidelines must be slightly modified according to the hospital information systems used in the other hospitals, this guide is described exactly for UNIS (NIS used in the FNKV)

Data extraction in NIS:

1 we prepare a table with PŘÍPADY and fill in the birth numbers of the cases who were supported by the hospital palliative care team. We chose the code „terminated hospitalization“ and the latest hospitalization as well. We searched in database tables VYKPRIP as follows:
    - a.i.1 ID case (automatically generated identification number of the case)
    - a.i.2 RC (birth number)
    - a.i.3 DATZAC (date of the beginning of the case‘s hospitalization)
    - a.i.4 DATKON (date ot the end of the case‘s hospitalization)
    - a.i.5 UKONCENI (the code of the termination of the hospitalization)

We connect the RC (birth number) with the table of cases‘ birth numbers using the function „join!“

2 In the cases with other code of termination than number 7 or 8 (died, autopsy provided/not provided) we check the electronic documentation of the case, there we find discharge or transfer medical report and confirm, that this is really the last hospitalization on acute bed. In this cases, the patient was transferred to the long-term ward in the hospital and so we prepare another table with this exceptions called PŘÍPADY_JINÉ

3 In the next step we prepare the table called DOKLADY, which contains numbers of the hospital bills and vouchers during this terminal hospitalization.

The numbers of the bills are searched in database tables VYKPAC (all bills) where we chose the items from the columns:

- a.i.1 CDOKL (numbers of the bills)
- a.i.2 RC, where it is necessary we use function „join“
- a.i.3 DATUM, where we use the function „more or equal“ and „less or equal“ than the beginning and the end of the terminal hospitalization from the table PŘÍPADY.

Using the function „join!“ we connect the table PŘÍPADY through RC and the date, so we have all the documents billed to the insurance company during the hospital case.

4 In the next table called VÝKONY we chose all the health executions from the bills and we summarize their point values and costs and joining them to the birth numbers from the database table VYKVYKON. In the table VYKVYKON we chose the columns:

- a.i.1 CDOKL (number of the bill), where we use the function „join“
- a.i.2 BODY(points), where we use the function „calc sum“ to calculate the sum of all point values of the health executions
- a.i.3 CENA,(costs) where we use the function „calc sum“ to calculate the sum of all costs of the health executions on the bills

The table VYKVYKON is joined with the table VÝKONY through the numbers of the bills using the function „join!“. The result of this action is the table, where we have the total point values and the costs of the health executions billed to the insurance company during the last hospitalization of the patient and joined to the RČ.

5 On the bills there are not only health executions but also separaltely billed items (ZUP) – separately billed drugs (ZULP) and separately billed materials (ZUM). We use the similar approach for ZUP as we used for searching for the health executions. We search for values in the database table VYKMATE (all billed ZUP):

    a.i.1 CDOKL (number of the bill), where we use the function „join“
    a.i.2 TYP(type), where we use „1 or 2“ and then „3“
    a.i.3 CENA(costs), where we use the function „calc sum“ to calculate the sum of all costs of the health executions on the bills

6 We search for ZUP using the same approach as for the health executions. We join the table with numbers of the bills with the database table VYKMATER (Billed ZUP type 1 – distributed drugs 2 – individually prepared drugs 3 – health materials and 4 – stomatological materials). Firstly we chose the items with type 1 and 2 (distributed drugs, individually prepared drugs) and then the same approach is used for the items type 3 (health materials) We get two new tables ZULP and ZUM, where ZUP in the column CENA(costs) are joined to the RC (birth numbers)

7 The same approach as described in bullets 1-6 we use for patients, who were transferred to the long term care using the database VYKLDN, where we find the same tables as described before: VYKPRIP, VYKPAC, VYVYKON, VYKMATER. Afterwards we find the bills and join them with health executions, ZUM and ZULP. We prepare three tables with sum of the points and with the costs for health executions, ZULP and ZUM joined to the birth number.

8 We integrate all three tables using the function join and the summary table is created with this data:

    a.i.1 RC (birth number)
    a.i.2 BODY (sum of the points of the health executions)
    a.i.3 CENA VYKONY (sum of the all costs of the health executions)
    a.i.4 CENA ZULP (sum of the all costs of the ZULP)
    a.i.5 CENA ZUM (sum of the all costs of the ZUM)

We export this table into xls format and join the data from MS Office Excel

9 In Office Excel we join the data from NIS with RC using the function „vyhledat(search)“

10 We prepare comparison of the dyads, and we get the costs difference between health executions, ZULP and ZUM.

The pilot project of Ministry of health of the Czech Republic about implementation of the palliative care to the hospitals of acute and long-term care (registration project number CZ.03.2.63/0.0/0.0/15_039/0007277) run simultaneously to our Dying matters study (2019-2021). It described the differences in patients‘ trajectory and costs used for the healthcare in the group where palliative care team was integrated and the control group without palliative care.

The results were presented by professor Dušek from the The Institute of Health Information and Statistics of the Czech Republic on the National Conference of Palliative Medicine in 2022 in Ostrava. The results have not been published yet.

The pilot project described the healthcare trajectory of 3237 patients (1005 were from the University hospital Královské Vinohrady). When palliative care team was integrated during hospitalization, 57% of the patients died at home or in the house for elderly (comparing to 45% controls without palliative care). The palliative care group had 30% less re-hospitalizations and 3-time less days spent in the intensive care. The patients in palliative care group used the home hospices 5-times more often and home care agencies 2-times more often then the control group. The costs of healthcare from palliative care intervention in hospital to death were 219972 CZK (9310 EUR) in the palliative care group and 353965 CZK (14982 EUR) in the control group without palliative care.

Future research

Efforts are ongoing to repeat our study design and include more Czech hospitals to improve the generalizability and strength of the study. DECAREL study comparing the costs in five Czech hospitals and using the same design as our Dying matters study is now in progress. Economic evaluation studies in palliative care are available mostly from English-speaking countries and show conflicting results. Cost-effectiveness was proven in palliative home care services in large multi-center studies. (Singer,2016; Seow,2014; Riolfi,2014) On the other hand, some studies did not show significant results mainly in hospital settings, (Bajwah,2020; Brinkman-Stoppelenborg,2020) Most of those with positive impact of palliative care on cost savings in hospitals were conducted in the USA, the UK, or Ireland. (Smith, 2014; Singer,2016; Yi,2020) Health systems in non-English speaking countries can be different and smaller studies in some European countries mentioned in this study failed to prove any benefit on cost savings in hospital palliative care services. (Hagemann,2020) More multi-center international and country-specific studies on the cost-effectiveness of hospital palliative care interventions are still needed to increase the evidence in this field.

4.6 Conclusion

Our findings suggest that hospital palliative care teams can help provide cheaper end-of-life care. The cost savings are probably associated with the fact that patients with palliative team support have significantly fewer days spent in the ICU and shorter terminal hospitalizations. Moreover, palliative care intervention may help define the context of care as the dying phase is more often documented in medical records when patients are supported by the palliative care team.

This study also shows that integration of the hospital palliative care team during the dying phase can have some benefits and can bring improvement of the quality of care. When a palliative care team is integrated in the patient's care, their preferences are documented, prognosis and limitation of care is more often discussed and documented, and this can result in lower utilization of invasive treatments and fewer days spent in the ICU. Integration of palliative care ensure also better family support.

5. Study: Translation, cultural adaptation and validation of Integrated Palliative Outcome Scale –renal (IPOS-r) to Czech

This study was designed to improve symptom assessment and quality of care of patients with advanced kidney disease by providing translation, cultural adaptation and validation of the IPOS-r outcome measure.

The study was approved by the Ethical Committee of Faculty Hospital Kralovske Vinohrady [EK-VP/I1101202] and the Ethical Committee of Fresenius Medical Care [ekfmc_301/20], and all study participants signed informed consent forms. All methods in this study were performed in accordance with the ethical principles and Declaration of Helsinki.

The study was funded by Charles University Grant Agency [GAUK No 82121].

I presented the study results on the Conference of the Czech Nephrologic society in Prague in 2022 under the section “Original studies” and my abstract describing the study was accepted for the poster presentation in the EAPC 18th World Congress in Rotterdam in 2023.

The study results were published open-access in international peer-reviewed journal BMC Palliative care. (Křemenová, 2022)

5.1. Background

The quality of care for the purpose of health evaluation can be defined in relation to its effectiveness with regard to improving the patient’s health status and quality of life, and how well it meets standards about care provision (Evans,2013)

The requirement for improved and cost-effective PC services is a global policy imperative.

Generally, people can expect to die following a period of prolonged chronic disease and increasing symptom burden and dependency. (Lunney, 2003)

Services in palliative care should improve patients’ and carers’ quality of life through the prevention, early identification and relief of distressing physical, psycho-social and spiritual issues.

Patient’s reported outcome measures (PROMS) should be used to monitor clinical care, carry out comparative research, and provide audit data. (Hearn, 1997)

In clinical use, PROMS are used for measuring baseline level of symptoms and concerns, repeated measurement can monitor changes in health status, it can facilitate communication between patients and clinicians and can be used for evaluation of the effect of clinical interventions.

In audit, PROMS can help with systematic approach to evaluate quality of performance of different services, monitoring practices and comparing standards in between different organizations.

In research, PROMS can measure symptoms, monitor changes, evaluate effect of novel interventions and avoid observer bias.

PROMS measure health status, needs, concerns and quality of life of patients in different time points. They can produce valuable data to assist patients and clinicians to make better decisions, they may increase clinicians' attention to patient concerns which are often overlooked,[4] they can stimulate improvement of care and services, they involve the patient’s views in decision making and help to avoid clinician’s bias.

According to a big international survey published in 2011 (Bausewein, 2011) the majority of respondents in Europe (68.1%) and in Africa (73.6%) had experiences with PROMs in palliative care and more than half of respondents in both continents were using PROMs.

Good outcome measure in palliative care should be short, applicable across different settings, responsive to change in health status, and capture clinically important data. PROMS should demonstrate good content and face validity, reliability, and they should be linguistically and culturally sensitive, accessible and appropriate. (Evans, 2013; Mokkink,2010)

Validity means, that a tool measures what it should. Face and content validity measure, whether a tool is assessing relevant aspects of care and if domains covered are appropriate. High face validity increase cooperation and motivation of the patients to complete the measure.

Criterion validity describes how the measure correlates with another instrument assessing the similar constructs, correlation with “gold standard”.

Reliability is measured by inter-rater reliability, test-retest reliability and internal consistency.

Inter-rater reliability assess, whether similar results are reached when different observers complete the measure. Test-retest reliability measure, if results are similar under unchanged conditions. Internal consistency measure how individual items correlate with each other.

Appropriateness means, if the measure is suitable for intended use and if it is easy, short and feasible for the patients. Good accessibility means, that measure is fully published and available for download and clinical use.

Responsiveness to change means, that the measure can detect clinically important change over time or after intervention.

It should also have good interpret-ability and the results can be translated into something meaningful to the patients and staff.

The only validated PROM in palliative care in the Czech Republic is the Integrated Palliative Outcome Scale (IPOS). (Vlckova, 2020) IPOS consists of 10 questions which cover main symptoms, patient and family distress, well-being, sharing feelings with family, practical concerns and information needs. Czech IPOS has shown very good reliability regarding internal consistency and good validity and temporal stability. The translation, cultural adaptation and validation of the Czech IPOS was done on 140 patients in hospices and hospitals across the Czech Republic. The number of patients from the hospital and hospice were similar (43% vs 57%). In the sample, there were few more women (64%) and most of the patients suffered from oncologic disease (81%).

There is a trend to integrate palliative care not only in cancer, but also in non-cancer chronic diseases. (Mounsey, 2018) Most deaths occur in those aged over 75 years, who frequently experience multiple debilitating diseases and largely die from chronic diseases, notably heart disease, rather than cancer.

Patients with end-stage renal disease (ESRD) suffer from a high symptom burden, which is comparable to those living with advanced cancer. (Weisbord, 2003; Almutary, 2013) Persistent physical or psychological symptoms impair functional status, well-being, and health perception and contribute to a lower quality of life (QoL). (Ferrans, 2005) Patients with end-stage renal disease can be treated by conservative management, peritoneal dialysis, or haemodialysis – either in form of home haemodialysis or haemodialysis provided in a health-care center. These patients have many distressing symptoms that should be assessed by a validated measure. Patients treated with dialysis can live longer, but this survival benefit disappears in frail elderly patients with many comorbidity, (Chandna, 2011) and their functional status and independence in daily living activities significantly decrease after starting dialysis. (Kurella Tamura, 2009)

The recognition of symptoms and problems by health care staff caring for these patients is often inadequate. (Almutary, 2013; Feldman, 2013) They focus mainly on physical symptoms and rely on standard consultation, and the recognition of the severity of symptoms is often poor. (Raj, 2017; Weisbord, 2007) Using patient-reported outcome measures (PROMS) on a regular basis can improve QoL and outcomes in advanced kidney disease. (Morton, 2020; McLaren, 2021) The optimal PROMS should be short, sensitive to a change in health status, easy to administer, valid, and reliable for the tested population. (Aiyegbusi, 2017; Murtagh,2019) There are several PROMS available for renal patients, and some of them are used despite limited validation data.(Aiyegbusi, 2017) According to a national survey conducted in renal clinics in Australia and New Zealand, IPOS-r was the most frequently used measure. (Mortin, 2020) The Integrated Palliative Care Outcome Scale-renal (IPOS-r) was developed by the Palliative Care Outcome Scale (POS) team in the United Kingdom as a result of demand from clinicians to merge the IPOS and the POS-renal. The parent measure IPOS has been validated in a population of palliative care patients with both cancer and noncancer diagnoses, so it is not the best measure for use in renal patients. (Murtagh, 2019) This was the reason for the development of the IPOS-r measure. IPOS-r contains eleven questions. First two questions contain some symptoms specific to advanced renal disease. From question three to question seven there are psychological domains such as anxiety, depression and feeling at peace, and the last four questions are about information needs, satisfaction with health care, and practical issues. The English renal-specific version of the symptom checklist, the IPOS-r, shows good test-retest reliability, internal consistency, and construct validity in patients with advanced chronic kidney disease and was recommended for symptom assessment. (Raj, 2018) The IPOS-r offers patient- and staff-completed versions assessing the same domains, both with good psychometric properties. (Raj, 2018)

The full parent-measure IPOS has already been translated, culturally adapted, and validated in the Czech Republic, but it is not suitable for renal patients, as the measurement tool was tested on palliative patients in hospices and hospitals, 81% of whom had cancer. (Vlckova, 2020) The use of the IPOS-r on renal patients has not yet been tested in the Czech Republic.

The IPOS-r has thus far been validated in the English version only, (Raj, 2018) with only few country-specific validated translations available.

5.2. The aim

The aim of our study was to bridge this gap of no patients reported outcome measure for palliative renal patients . We aimed to provide a translation, cultural adaptation, and validation of the Czech IPOS-r and to assess the convergent validity of the IPOS-r by the correlation to the KDQOL-SF 1.2 (Kidney disease quality of life-short form 1.2). KDQOL is the only validated measure that is used in the Czech Republic for assessing the symptom burden of patients with advanced renal disease.

5.3 Methods

This was a mixed-method multi-center study conducted in five facilities in the Czech Republic (one outpatient renal clinic and four dialysis centers). The study was approved by the Ethical Committee of Faculty Hospital Kralovske Vinohrady [EK-VP/I1101202] and the Ethical Committee of Fresenius Medical Care [ekfmc_301/20].

When preparing the study design, we followed the COSMIN checklist (Mokking,2010) for evaluating the methodological quality of studies on outcome measurement

5.3.1 Concept analysis

The first step was a brief literature review of all concepts used in the IPOS-r followed by the translation and cultural adaptation of the measure.

5.3.2 Translation and cultural adaptation

This phase was based on guidelines for translation and cultural adaptation of the IPOS family instruments, available on the POS web page. (Antunes, 2019)

These guidelines are based on ISPOR (International Society for Pharmacoeconomics and Outcomes Research) guidelines (Wild, 2005) and are included in the Mapi Research Trust library specializing in Patient-Centred Outcomes.

Forward translation of IPOS-r was made by two translators with Czech as their first language: one was a health care worker, and the other was a professional interpreter. Their translations were merged by the research team, and the version for cognitive interviews was created. The Czech version of IPOS-r was then translated back into English by two translators with English as their first language, one with and one without a health care background, and both versions were sent to the POS team in the United Kingdom for the final check.

The final corrected version was used afterwards for cognitive interviews. We performed in-depth qualitative interviews to check the views of patients and staff on the outcome measure.

We interviewed ten patients with advanced kidney disease (three were on conservative management and seven were on haemodialysis) and ten members of the health care team (three physicians, six nurses, and one social worker). We used a convenience sample of respondents who were available and willing to participate in the renal clinic and two dialysis centers at two time-points. Here is a brief guide to the cognitive testing.(Table 6)

Table 6. Cognitive testing guide

1. Patient/staff completed the IPOS-r.
2. We asked them how they understood the questions and the answers and how they chose from them.
3. We assessed how well they understood the measure and compared their assessment with their answers. In the case of misunderstandings, we asked

them what was confusing, and then reformulated the wording.
4. For every item, we asked if was relevant for them.
5. Ultimately, we asked if the length of the measure was acceptable and if the recall period was optimal.
6. We asked if there were any questions that caused discomfort.
7. All the answers and comments on the measure were written down on the table, which was prepared for this purpose.

Content analysis of the answers and comments was performed, and the final IPOS-r version was created using patients' and staff's views of the measure. We used one-to-one interviews in which verbalization was used to access the thoughts and feelings, and to understand the ideas and interpretations, of respondents who are being asked to process information. (Willis, 2013) We used 'think-aloud' technique which was used retrospectively (once a measure was completed).

5.3.3 Validation

The validation phase was conducted in one outpatient clinic (Faculty Hospital Kralovske Vinohrady in Prague) and four dialysis centers across the Czech Republic (BBraun Avitum Ohradni in Prague, Fresenius Medical Care in Melnik, Fresenius Medical Care in Louny and Fresenius Medical Care in Slany). Data were collected by physicians, nurses, and social workers during regular patient encounters, or patients sent the completed measure by post. We included a convenience sample of adult patients with advanced kidney disease (eGFR < 15 ml/min/1.73m^2) who were treated with haemodialysis, home haemodialysis, peritoneal dialysis, or conservative management. We excluded those who were cognitively impaired, did not have the Czech language as their mother tongue or were too unwell to participate. Patients were asked to participate by the health care professionals who were involved in the patient's care. Participants completed the Czech IPOS-r independently or with help from their families or health care provider. Doctors, nurses, or social workers completed their version on the same day independently from the patients.

Measurement data were collected at three time points. Different instruments were used at each time point. At the first time point (T1), patients completed the Czech IPOS-r patient version and the Czech KDQOL-SF 1.2, and health care staff independently completed the Czech IPOS-r staff version. At the second time point (T2), patients completed the Czech IPOS-r three days after the first questionnaire had been completed. At the third time point (T3), the Czech IPOS-r was completed one month after the first questionnaire, and the patients answered an item asking if their situation had changed since their last completed the IPOS-r. The answer options for this external change criterion were “no”, “yes, negative change” or “yes, positive change”. A negative change meant deterioration of the patient's overall condition, a positive change denoted an improvement in the patient's overall condition. It was hypothesized that an improvement in the patient's overall condition would be associated with a lowering in IPOS-r scores between the time points; deterioration in the patient's overall condition would be associated with an increase in IPOS-r scores. During the third assessment, patients also completed the time needed to complete the IPOS-r.

5.3.4 Statistical analysis

Demographic data were reported using descriptive statistics. Patients who had any missing values in the IPOS-r were excluded from the analysis. A significant p value was set at 5%, and all analyses were conducted using SPSS version 28.01. We tested the item analysis, reliability, and validity of the Czech version of the IPOS-r as follows:

5.3.4.1 Item analysis

For every item of the IPOS-r, we computed the mean and standard deviation. We also computed item difficulty via the individual item‘s mean score and converted it to an interval (0;1) using the formula individual item mean-scale min/(scale max-scale min). Correlations with the total score without a particular item were also provided. Item analysis provides information about the variance of scores and is also used for content validity. (Cappelleri, 2014) Exploratory factor analysis was not done due to the small sample size.

5.3.4.2 Internal consistency

The internal consistency was determined via Cronbach's α for the total score of the IPOS-r.

5.3.4.3.Reliability

Two types of reliability were computed. Test-retest reliability was determined based on the first and second assessments of the IPOS-r. We computed the level of perfect agreement for each item with quadratic weighted kappa. The test-retest reliability of the IPOS-r total score was assessed with intraclass correlation coefficients (ICCs). ICCs of 0.7 were considered acceptable, but values > 0.8 indicated high test-retest reliability. (De Vet, 2011) Inter-rater reliability was determined for patient and staff ratings at the first time point using weighted kappa, level of agreement for every item, and ICCs for the total score. The level of kappa from 0.41 to 0.60 was considered moderate, 0.61–0.80 as substantial, and 0.81–1 as almost perfect. (Landis, 1977; Viera, 2005)

5.3.4.4 Sensitivity to change

We also assessed the sensitivity to change in our sample using a distribution-based approach (Crosby, 2003) We compared mean changes based on the global change rating, which was assessed by patients during the third assessment after one month. Patients were divided into three groups: positive change, negative change, and no change according to their own assessment. The comparison was performed only using descriptive statistics, i.e., the mean change in T1 and T3.

5.3.4.5 Validity

To assess the convergent validity of the IPOS-r, we used the KDQOL-SF 1.2, which is the only validated measure that is used in the Czech Republic for assessing the symptom burden and concerns of patients with renal disease. We expected a high correlation ($r > 0.70$) for items related to the physical status of patients as there are similar or identical items in KDQOL and a mid-range correlation (0.5–0.7) between items related to psychological and information needs. We matched IPOS-renal items with KDQOL-SF items according to the meaning so they were covering the same construct.(Table 7) There was a whole team consensus on the selected items using content analysis. If there were no questions assessing the same concept, we chose those assessing the most similar items; however, some concepts in the IPOS-r were missing in KDQOL (constipation, diarrhoea, sore or dry mouth). To assess validity, we used nonparametric Spearman correlations.

Table 7 Items from the IPOS-r matched to the items from KDQOL-SF covering the similar constructs and their estimated correlations.

Items from IPOS-r	Items from KDQOL					Correlation
Pain	KDQOL7 How much pain have you had in the past 4 weeks?	KDQOL8 During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework) ?				R > 0.70
Shortness of breath	KDQOL14f During the past 4 weeks, to					R > 0.70

	what extent were you bothered by each of the following? – shortness of breath					
Weakness or lack of energy	KDQOL9a These questions are about how you feel and how things have been with you during the past 4 weeks. How much of the time during the past 4 week did you have a lot of vigor?	KDQOL9e These questions are about how you feel and how things have been with you during the past 4 weeks. How much of the time during the past 4 week did you have a lot of energy?	KDQOL9g These questions are about how you feel and how things have been with you during the past 4 weeks. How much of the time during the past 4 week did you feel exhausted?	KDQOL9i These questions are about how you feel and how things have been with you during the past 4 weeks. How much of the time during the past 4 week did you	KDQOL14i During the past 4 weeks, to what extent were you bothered by each of the following? Washed out or drained?	R> 0.70

				have feel tired?		
Nausea	KDQOL14k During the past 4 weeks, to what extent were you bothered by each of the following? Nausea or upset stomach					R> 0.70
Vomitting	KDQOL14k During the past 4 weeks, to what extent were you bothered by each of the following? Nausea or upset stomach?					R> 0.70
Poor appetite	KDQOL14h During the					R> 0.70

	past 4 weeks, to what extent were you bothered by each of the following? Lack of appetite?					
Constipation	Not available					Not available
Sore or dry mouth	Not available					Not available
Drowsiness	KDQOL14i During the past 4 weeks, to what extent were you bothered by each of the following? Washed out or drained?					R > 0.70
Poor mobility	KDQOLsum 3a-3j					R > 0.70

	Some people are bothered by the effects of kidney disease on their daily life, while others are not. How much does kidney disease bother you in each of the following areas?					
Itching	KDQOL14d During the past 4 weeks, to what extent were you bothered by each of the following? Itching?					R > 0.70
Difficulty	KDQOL18a	KDQOL18b	KDQOL18			R > 0.70

sleeping	How often in the last 4 weeks did you wake up at night and couldn't get back to sleep?	How often in the last 4 weeks did you get enough sleep?	c How often in the last 4 weeks did you have difficulty staying awake during the day?			
Restless leg	KDQOL14j During the past 4 weeks, to what extent were you bothered by each of the following? Loss of sensation in hands or feet?					R> 0.70
Changes to skin	KDQOL14e During the past 4 weeks, to what extent					R> 0.70

	were you bothered by each of the following? Dry skin?					
Diarrhea	Not available					Not available
Thirst	KDQOL15a Some people are more bothered by the consequences of kidney disease in everyday life, and some are not at all. How much does kidney disease bother you in the following areas? Restriction of fluid					R > 0.70

	intake?					
Anxiety	KDQOL9b How often in the past 4 weeks have you felt nervous?	KDQOL15f Stress or anxiety associated with the illness				R= 0.5-0.7
Family/friends anxiety	KDQOL12d I feel like I'm burdening the family					R= 0.5-0.7
Depression	KDQOL9c How often in the last 4 weeks have you been so depressed that nothing could cheer you up?	KDQOL9f How often in the last 4 weeks have you felt pessimism and sadness?	KDQOL9h How often in the last 4 weeks have you felt happy?			R= 0.5-0.7
Felt at peace	KDQOL9d How often in the last 4 weeks have you felt peace and calm?					R= 0.5-0.7
Able to share	KDQOL19b					R= 0.5-0.7

with family/friends	How satisfied are you with support from family and friends?					
Information	KDQOL23 Consider the care you receive in connection with dialysis. Regarding your satisfaction, how would you rate the kindness and interest shown to you?	KDQOL24b The dialysis staff is helping me cope with kidney disease.				R= 0.5-0.7
Practical problems	KDQOL24a The dialysis staff encourage me to be as self-sufficient as possible	KDQOL15e How much does kidney disease bother you in the following areas? Dependenc				R= 0.5-0.7

		e on doctors and other medical personnel?				
Time wasted on appointments	KDQOL12b Kidney disease is taking up too much of my time.					R= 0.5-0.7

5.4 Results

5.4.1 Sample size

Sample size of 100 patients was decided according to comparison with similar validation studies.

From March 2021 to December 2021, we collected data from 100 patients. However, the IPOS-r data of 12 patients were incomplete and excluded from the final analysis. The final sample consisted of 88 patients with advanced chronic renal disease. The mean age in this sample was 66.1 (SD=13.8), and 58% of the patients were men. They were treated with haemodialysis (70.5%), home haemodialysis (5.5%), peritoneal dialysis (3%), and conservative management (21%).

5.4.2 Cognitive interviews

A project team member who is a psychologist by background with experience in cognitive interviews conducted ten qualitative interviews with renal patients and ten interviews with the health care staff in two dialysis centers and one hospital renal unit. We assessed the face and content validity of the IPOS-r. The interviews covered all questions on the measure. We checked for their comprehensibility, appropriateness, and relevance for the interviewees, and if any problematic parts were found, participants were able to reformulate the IPOS-r questions and answers. All the questions and answers of the IPOS-r were acceptable for the interviewees; we only had to add an explanation of restless leg syndrome, as the concept was not completely clear for those patients who had never experienced it. Participants also suggested adding the “cannot answer” option to the psychological domains of the measure. Health care staff were concerned about the question, “Have you felt at peace?” Although three of the ten thought that patients would not understand the question, none of the patients had any difficulty answering the question.

5.4.3 Item analysis

In Table 8, we present descriptive statistics, percentages of answers for each value, mean and standard deviation of all IPOS-r items. We also measured the item difficulty and correlation of each item with the total score. The minimum difficulty was 0.05 for vomiting, and the maximum was 0.48 for anxiety of family/friends. Most of the item-total correlations were higher than 0.3; only for constipation, diarrhea, practical problems, and time wasted on appointments there was a lower value.

Table 8 Distribution of scores and item analysis (N= 88)

IPOS Item	% response for each IPOS value						Mean	SD	Item difficulty	Item total correlation
	0	1	2	3	4	Can not answer				
Pain(i2)	47	15	25	12	1	0	1.1	1.2	0.28	0.43
Shortness of breath(i2)	59	22	11	7	1	0	0.7	1	0.18	0.41

Weakness or lack of energy(i2)	22	33	31	14	1	0	1.4	1	0.35	0.71
Nausea(i2)	78	14	5	2	1	0	0.3	0.8	0.08	0.43
Vomiting(i2)	91	5	3	1	0	0	0.2	0.5	0.05	0.32
Poor appetite(i2)	67	23	8	1	1	0	0.5	0.8	0.13	0.42
Constipation(i2)	74	13	8	3	2	0	0.5	0.9	0.13	0.14
Sore or dry mouth(i2)	48	27	15	9	1	0	0.9	1	0.23	0.49
Drowsiness(i2)	38	26	22	14	1	0	1.1	1.1	0.28	0.64
Poor mobility(i2)	37.5	27	16	12.5	7	0	1.2	1.3	0.3	0.66
Itching(i2)	51	31	8	8	2	0	0.8	1	0.2	0.35
Difficulty sleeping(i2)	44	18	24	9	5	0	1.1	1.2	0.23	0.5
Restless leg(i2)	66	17	10	7	0	0	0.6	0.9	0.15	0.46
Changes to skin(i2)	63	19	0	16	2	0	0.6	0.9	0.08	0.3
Diarrhea(i2)	81	9	9	1	0	0	0.3	0.7	0.08	0.21
Thirst(i2)	35	32	15	8	10	0	1.3	1.3	0.33	0.51
Anxiety(i3)	47	20	25	6	2	0	1	1.1	0.25	0.42
Family/friends' anxiety(i4)	27	9	34	15	15	0	1.9	1.4	0.48	0.32
Depression(i5)	62.	20.	12.	4.	0	0	0.6	0.9	0.15	0.56

	5	5	5	5						
Felt at peace(i6)	23	37.5	20.5	15	4	0	1.4	1.1	0.35	0.41
Able to share with family/friends(i7)	37.5	12.5	31	11	8	0	1.4	1.3	0.35	0.36
Information(i8)	47	25	9	8	11	0	1.1	1.4	0.28	0.23
Practical problems(i9)	57	14	12	9	8	0	1	1.3	0.25	0.18
Time wasted on appointments(i10)	54.5	0	41	0	4.5	0	1	1.2	0.3	0.27

Item difficulty is measured with the individual item's mean score and is converted to an interval (0;1) using the formula mean-scale min/(scale max-scale min).

Item total correlation score refers to correlations with the total score without a particular item.

5.4.4 Internal consistency

Cronbach's alpha for the total score of 24 items was 0.72 (Tavakol, 2011)

5.4.5 Reliability

Test-retest reliability was computed for all items and for the total score. We present the mean scores at T1 and after 3 days (T2), and weighted Cohen's kappa in Table9. Most of the kappa coefficients (22 of 24) were above 0.4; only for the items vomiting and information needs was the value below 0.4. The mean at the first time point was M= 21.8 (SD=11.3), and for the second time point, it was M= 20.1 (SD=12.1). The ICC for the total score was 0.84 (95% CI=0.76-0.90).

Inter-rater reliability for patients and staff was based on data from the first time point(T1). For 11 items out of 24, we found agreement between the staff and patient assessment weighted kappa > 0.4, with the highest level of agreement for pain (0.66) and changes to the skin (0.56). The lowest level of agreement was found for anxiety (0.17). For the total score, the ICC was 0.73 (95% CI = 0.6-0.8). (see Table 10)

Table 9 Test-retest reliability measured by weighted kappa and level of agreement between T1 and T2 (three days later) (N= 88)

Item	T1 mean	T2 mean	Agreement (%)	Weighted kappa
Pain	1.1	1.1	61	0.53
Shortness of breath	0.7	0.8	68	0.67
Weakness or lack of energy	1.4	1.4	61	0.64
Nausea	0.3	0.2	82	0.46
Vomiting	0.2	0.1	87	0.33
Poor appetite	0.5	0.4	76	0.54
Constipation	0.5	0.4	82	0.67
Sore or dry mouth	0.9	0.7	65	0.58
Poor mobility	1.2	1.3	65	0.69
Itching	0.8	0.8	76	0.75
Difficulty sleeping	1.1	1.1	69	0.72
Restless legs	0.6	0.6	83	0.76
Changes to skin	0.6	0.5	75	0.58
Diarrhea	0.3	0.2	78	0.42
Thirst	1.3	1.3	58	0.62
Anxiety	1	1	61	0.53
Family/friends’	1.9	1.7	61	0.61

anxiety				
Depression	0.6	0.7	70	0.61
Felt at peace	1.4	1.5	60	0.51
Able to share with family/friends	1.4	1.4	53	0.43
Information	1.1	1.2	57	0.33
Practical problems	1	0.8	73	0.59
Time wasted on appointments	1	0.7	74	0.51

Table 10 Inter-rater reliability measured by weighted kappa and level of agreement (N= 88)

Item	Weighted kappa	% level of agreement
Pain	0.66	65
Shortness of breath	0.54	65
Weakness or lack of energy	0.36	43
Nausea	0.33	69
Vomiting	0.55	70
Poor appetite	0.36	68
Constipation	0.44	75
Sore or dry mouth	0.28	49
Drowsiness	0.41	47
Poor mobility	0.49	49

Itching	0.45	57
Difficulty sleeping	0.3	35
Restless legs	0.38	68
Changes to skin	0.56	70
Diarrhea	0.43	81
Thirst	0.42	41
Anxiety	0.17	23
Family/friends' anxiety	0.26	34
Depression	0.35	43
Felt at peace	0.39	49
Able to share with family/friends	0.3	35
Information	0.22	32
Practical problems	0.41	50
Time wasted on appointments	0.35	61

T1=first time point, T2=second time point after 3 days

5.4.6 Sensitivity to change

Table 11 represents the change in IPOS scores between the first time point (T1, baseline) and the third time point (T3 after one month). Patients who reported positive changes after one month had a positive mean change in the total scores of eight points (a lower level of total score indicates less severe symptoms and concerns). Similarly, patients who reported negative changes showed a negative eight-point difference between the time points T1 and T3, signifying an increase in IPOS scores and more severe symptoms and concerns.

Table 11 Mean total IPOS-r score changes (between T1 and T3) by global change scale

	N (88)	Mean change T1–T3 (95% CI)
Yes, positive change	4	8.25 (4.08 to 11.9)
Yes, negative change	10	-8.6 (-11.1 to -4.9)
No change	47	0.6 (-2 to 2)
Missing data	27	

T1=first time point, T3=third time point, one month after the first time point

5.4.7 Validity

Convergent validity was assessed using Spearman correlation with items from KDQOL-SF 1.2. Most of the correlations were in the range of 0.4–0.8. (Table 12). Only questions about family anxiety, practical problems, information needs, and time wasted on appointments did not have a significant correlation with items from the KDQOL-SF 1.2

Table 12 Spearman correlations of IPOS-r and KDQOL items (N= 88)

Items from IPOS-r	Items from KDQOL Spearman correlations between IPOS-r and KDQOL-SF 1.2				
Pain	KDQOL7 0.77**	KDQOL8 0.69**			
Shortness of breath	KDQOL14f 0.76**				

Weakness or lack of energy	KDQOL9a 0.54**	KDQOL9e 0.56**	KDQOL9g -0.58**	KDQOL9i -0.68**	KDQOL14i 0.72**
Nausea	KDQOL14k 0.58 **				
Vomiting	KDQOL14l 0.49**				
Poor appetite	KDQOL14h 0.69**				
Constipation	Not available				
Sore or dry mouth	Not available				
Drowsiness	KDQOL14i 0.55**				
Poor mobility	KDQOLsum 3a-3j -0.68**				
Itching	KDQOL14d 0.8**				
Difficulty sleeping	KDQOL18a 0.68**	KDQOL18b -0.4**	KDQOL18c 0.28*		
Restless legs	KDQOL14j 0.33**				
Changes to skin	KDQOL14e 0.37**				

Diarrhea	Not available				
Thirst	KDQOL15a 0.48**				
Anxiety	KDQOL9b -0.43**	KDQOL15f 0.45**			
Family/friends' anxiety	KDQOL12d -0.32**				
Depression	KDQOL9c -0.55**	KDQOL9f -0.48**	KDQOL9h 0.49**		
Felt at peace	KDQOL9d 0.51**				
Able to share with family/friends	KDQOL19b -0.14				
Information	KDQOL23 -0.14	KDQOL24b 0.26*			
Practical problems	KDQOL24a -0.12	KDQOL15e 0.04			
Time wasted on appointments	KDQOL12b -0.08				

**significant at p=0.05*

***significant at p=0.01*

5.4.8. Appropriateness and acceptability

The IPOS-r was feasible and acceptable for the patients and the staff. They appreciated its clarity and shortness. The average time to complete the measure was nine minutes, which was acceptable to all participants.

5.5 Discussion

Patient-reported outcome measures (PROMs) are very useful tools to capture patients’ experience with the disease and health care. (Raj, 2017; McLaren, 2021) Translation and validation of PROMs are needed, as they are used not only in clinical practice but also in research and auditing. The IPOS-renal measure does not have any validated translations except the English version.

The aim of this study was to adapt the IPOS-R to the Czech conditions. The Czech translation and cultural adaptation of IPOS-r were performed successfully, and no major changes were required after cognitive interviews except for adding a description of restless leg syndrome. The IPOS option “cannot answer”, which was suggested by participants of the cognitive interviews for psychological domains, was not used by our participants in this study; therefore, it was omitted. The Czech version of IPOS-r version is short, and the time needed to complete it is acceptable for patients and staff.

5.5.1 Item analysis

Item analysis showed that all the items in the IPOS-r met the requirements for item difficulty and item-total correlation. The lowest discriminant ability was found in the item vomiting because 91% of patients did not report this symptom. This is consistent with previous results and validation of the parent measure Czech IPOS on palliative patients. (Vlckova, 202) Another study with patients from hospitals and home-based palliative services found similar results when vomiting, practical matters, and having enough information did not have a full range of responses. (Murtagh, 2019)

5.5.2 Reliability and internal consistency

The IPOS-r showed sufficient internal consistency, excellent test-retest reliability, and moderate agreement between the staff and patient assessment, especially in physical domains. In some of the physical domains, namely, weakness, nausea, poor appetite, difficulty sleeping, restless legs and sore or dry mouth, the study showed lower than moderate inter-rater agreement, so clinicians should focus on the assessment of these symptoms, as they seem to be overlooked.

Weighted kappa values for inter-rater reliability were found as sufficient for physical items (such as Pain or Changes to the skin), but they were in the range ‘‘poor’’ only for anxiety; lower than moderate agreement was seen in most nonphysical domains (feeling at peace, depression, ability to share feelings with family, time wasted on appointments), which were more difficult to assess. Similar results were also found in a study assessing the psychometric properties of the original English version of the IPOS-r. (Raj, 2018; Sacks, 2018)

5.5.3 Validity

Similarly, we were able to demonstrate good convergent validity for IPOS-r when compared to the KDQOL-SF 1.2 measure in most domains. This could signal redundancy of IPOS-r when compared to KDQOL-SF1.2, but the latter is not clinically used due to its length and extensiveness. An advantage of IPOS-r may be that the measure is able to cover similar domains to the KDQOL-SF 1.2 while at the same time being shorter and being more feasible for routine clinical measurement. Most of the correlations stated in the range of 0.4–0.8, which indicated a good convergent validity. The only items without sufficient correlation between IPOS-r and KDQOL-SF1.2 were a family anxiety, ability to share with family, need for information, practical problems, and time wasted on appointments. These domains were not covered by the KDQOL exactly, so we matched them with similar concepts, which could have lowered the convergent validity. Diarrhoea, constipation and sore or dry mouth concepts were not present in KDQOL, so correlations could not assessed for these symptoms. As we did not have any other tool to measure QoL available in the Czech Republic, we were not able to confirm the validity of the IPOS-r for all items, and this needs further investigation.

5.5.4 Sensitivity to change

We tried to assess sensitivity to changes in IPOS-r. However, due to the small sample size, we were able to show only trends that would need to be further investigated. Sensitivity to change of the original IPOS was also approved by other studies. (Murtagh, 2019; Sacks, 2018) Because of the small number of patients reporting the relevant change in one month, we could not have calculated the Wilcoxon signed-rank test.

5.5.5 Limitations

This study has several limitations.

First, patients were asked to participate by the health care professionals who were involved in the patient's care, which could be perceived as ethically problematic. We addressed this issue in the informed consent, where it was explicitly stated that refusing participation would not have any adverse implications for the clinical care.

Second, the numbers of patients enrolled into the study were not sufficient to provide factor analysis and to assess the domains of the Czech IPOS-r. We determined a sample size by exploring similar validation studies of IPOS translations and chose for the similar sample size as they did. In 12 out of 100 patients, IPOS data were not completed, which is common in end-of-life research and were excluded from the analysis as in other validation studies to perform item analysis, which was plausible in this situation. (Higginson, 2013; Radbruch, 1999; Schafer, 2002) Third, the renal patients in our study were very stable, with only 14 of 88 reporting a change in their health status after one month, so we could not calculate sensitivity to change by a statistical test. There were also some incomplete IPOS-r responses at time point three, one month after baseline, which could have been associated with lower compliance after a longer time period and deterioration of the patients' health. Further, the interval of the retest should be longer than one month to be able to assess sensitivity to change; on the other hand, this could increase the recall bias. Finally, the IPOS-r and KDQOL, which was used as gold standard, do not completely cover the same concepts; some domains assessed by IPOS-r are completely missing in KDQOL and vice versa, which can lower the convergent validity of the survey. However, the validity of the IPOS-r was also confirmed in cognitive interviews.

5.6. Conclusion

The process of translation and cultural adaptation of the IPOS-r was successfully performed, and our study confirmed that the Czech IPOS-r was a responsive, reliable, and valid tool. There is no other validated measure used by the Czech nephrologist in clinical care.

Our results recommend the use of the IPOS-r measure for the documentation of symptoms and concerns in patients with advanced chronic kidney disease, who are treated by either conservative management or dialysis.

6. Concluding remarks

Palliative medicine is a recent medical speciality with quite short history. It focuses on complex and holistic care of people with incurable disease. It uses multidisciplinary approach to lower bio-psycho-socio-spiritual suffering of patients with advanced disease and to support not only the patients but also their families.

In the theoretical part of this thesis I describe the basic terms and principles of palliative medicine, forms of specialist palliative care in the Czech Republic and indications for integration of palliative care in everyday clinical practise.

The practical part of the thesis contains two studies. In the first one, I focus on the effect of hospital palliative care consult team on the dying phase and costs during the terminal hospitalization.

The main aim of this part was to compare the costs of the terminal hospitalization in the university hospital when the palliative care team was integrated with the group of patients without palliative care. I proved that implementation of palliative care during the terminal hospitalization can save substantial costs. Daily costs were almost three times lower if the palliative care team had participated during the terminal hospitalization. The cost saving was probably associated with less time spent in the intensive care unit. Integration of specialist palliative care brought also some other benefits. Preferences of patients supported by palliative care team were documented better and more often. Context of care was clearer when palliative care team was invited as well as the fact that patient was dying had been written in medical records more often. Patients in the palliative care group displayed limitations of care discussed and stated clearly in their medical records. This was probably the reason why they were transferred to intensive care at far lower rates than patients in the control group. Palliative care intervention was associated also with more intensive family support of the dying patient.

Health care professionals and public usually believe, that palliative care is targeted mainly for dying cancer patients. On the other hand, patients with non-cancer diagnoses suffer from very complex problems and their symptom burden is very similar to those dying of cancer. The specialists in palliative care teams are often not called to non-cancer patients, even though the cardiovascular and other chronic diseases are the main cause of morbidity and mortality worldwide. Patients with advanced renal disease are very complicated for management, they have very complex needs and many burdensome symptoms, which are often overlooked. According to literature, patients reported outcome measures (PROMs) increase detection of suffering and help to manage symptoms and increase quality of life. That is why I provided the second study, in which we performed translation, cultural adaptation and validation of the IPOS-renal (IPOS-r) questionnaire. IPOS-r is PROM suitable for patients with advanced renal disease. It was developed in the UK and it is widely used in English speaking countries. It contains eleven questions and patients fill in the questionnaire by answering how they were affected by the symptoms or problems in last three or seven days. The first part focuses on physical symptoms, the second on psychological suffering and communication, and the last one on practical life problems and general satisfaction with provided health care. The translation, cultural adaptation and validation of the IPOS-r is available only in Danish, Portuguese and now also in Czech.

We provided the validation study on 100 patients with renal failure from four dialysis centres and one renal clinic. Patients were managed by hemodialysis, home hemodialysis, peritoneal dialysis and conservative management. We calculated internal consistency by Cronbach’s alpha and the total score of 24 items was 0.72, which documented a good internal consistency. We have found excellent test-retest reliability, and moderate agreement between the staff and patient assessment, especially in physical domains. In some of the physical domains, namely, weakness, nausea, poor appetite, difficulty sleeping, restless legs and sore or dry mouth, the study showed lower than moderate inter-rater agreement, and thus the clinicians should focus on the assessment of these symptoms, since they seem to be overlooked.

Weighted kappa values for inter-rater reliability were sufficient for physical items, but lower than moderate agreement was seen in most non-physical domains which are more difficult to assess. We were able to demonstrate a good convergent validity for IPOS-r when compared to the KDQOL-SF 1.2 measure in most domains. We also showed a very good acceptability of IPOS-r for patients, because of the measure was short (patients mean time of filling in the IPOS-r was 8 minutes).

All the parameters of the IPOS make it valid and reliable tool and we recommend it‘s use in daily clinical practice.

I believe that by my research work I successfully filled in the gap in this research field and there is already some positive evidence about it. The first study already drew a lot of readers interest. Publisher Mary Ann Liebert is holding its 2nd Annual Rosalind Franklin Special Award in Science for research led by female authors and I won the price for the best paper of the year in the Journal of palliative medicine. The second study was accepted to be presented in poster form in the EAPC world palliative congress this year in Rotterdam.

List of abbreviations

ADL=activities of daily living

CKD= chronic kidney disease

COPD= chronic obstructive pulmonary disease

DLCO= diffuse lung CO capacity

ECOG= Eastern Cooperativa Oncology Group

ESAS**=** Edmonton Symptom Assesment Scale

ESRD = end-stage renal disease

EoL=end of life

FEV1=forced vital capacitÿ in one second

ICC = Intraclass correlations

ICU=intensive care unit

IPOS-r = Integrated Palliative Outcome Measure-renal

ISPOR = International Society for Pharmacoeconomics and Outcomes Research

KDQOL-SF= Kidney Disease Quality of Life Survey-short form

M=mean

MELD score= Model for End Stage Liver Disease

NYHA= New York Heart Association

PROMS = patient-reported outcome measures

QoL= quality of life

SD = Standard Deviation

T1 = first time point

T2 = second time point

T3 = third time point

VC=vital capacity

WHO= World Health Organisation

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