

A Work Project, presented as part of the requirements for the Award of a Master Degree in Economics / Finance / Management from the NOVA – School of Business and Economics.

Fresenius Medical Care
The decade of the kidney
Benefitting from unhealthy lifestyles

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A Project carried out on the Master in (Economics/Finance/Management) Program, under the supervision of:

(Rosário André)

May 17th, 2023

Abstract

The equity research report of Fresenius Medical Care results in a “BUY” recommendation of FME stock with expected returns of 57.4% until end-of-2023.

Keywords

Fresenius Medical Care

Dialysis services and products

The decade of the kidney

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FRESENIUS MEDICAL CARE

DIALYSIS SERVICES AND PRODUCTS

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COMPANY REPORT

17 MAY 2023

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The decade of the kidney

Benefitting from unhealthy lifestyles

- The following analysis of Fresenius Medical Care AG & Co. KGaA, based on the cut-off date May 12th, 2023, estimates a share price target of EUR64.43 in December 2023. Considering the current share price of EUR43.76, a BUY recommendation is issued with total expected returns amounting to 57.4%
- The main value driver of expected returns of Fresenius Medical Care is an increasing amount of people suffering from chronic kidney failure due to demographic changes and unhealthy lifestyles.
- Value of Fresenius Medical Care to be capture in the long-term (TV of 87%) while in the short-term unprofitable business operations.
- Main risk in the business is increasing wages of health care services professionals, such as trained nurses, due to ongoing shortages of health care labour.
- Strongly regulated environment makes dialysis providers dependent on reimbursement rates set by government insurance organisations and commercial insurance companies.

Company description

Fresenius Medical Care AG & Co. KGaA is a global healthcare company that provides products and services for individuals with chronic kidney failure. The Company was founded in 1996 and is headquartered in Bad Homburg, Germany. With more than 128,000 employees, Fresenius Medical Care operates c. 4,100 dialysis centres in around 50 countries and sells dialysis products in c. 150 countries.

Recommendation: **BUY**

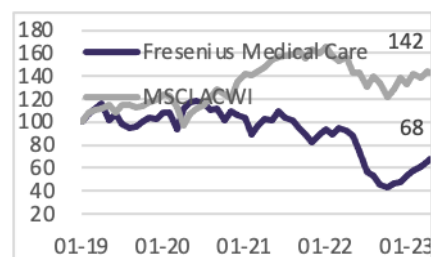
Price Target FY23: **64.43 €**

Price (as of 17-May-23) **43.76 €**

Reuters: FMEG.DE (Xetra), FMS.N (NYSE),
Bloomberg: FME GY (Xetra), FMS US (NYSE)

52-week range (€)	25.95-57.22
Market Cap (€m)	12,840
Outstanding Shares (m)	293.41

Source: Refinitiv



Source: Refinitiv

(Values in € millions)	FY22A	FY23F	FY24F
Revenues	19,398	20,851	22,667
% growth	10.1%	7.5%	8.7%
EBITDA	2,338	2,091	2,179
Net profit	894	465	451
UFCF	(45)	(53)	(363)
EBITDA margin	15.6%	10.0%	9.6%
ROIC	3.6%	2.7%	2.7%
EV/EBITDA	10.6x	17.5x	17.7x
Net debt/EBITDA	5.3x	7.0x	7.1x
Capex/Revenues	4.9%	7.6%	7.0%

Source: Company
information, analyst estimate

THIS REPORT WAS PREPARED EXCLUSIVELY FOR ACADEMIC PURPOSES BY [INSERT STUDENT'S NAME], A MASTER IN FINANCE STUDENT OF THE NOVA SCHOOL OF BUSINESS AND ECONOMICS. THE REPORT WAS SUPERVISED BY A NOVA SBE FACULTY MEMBER, ACTING IN A MERE ACADEMIC CAPACITY, WHO REVIEWED THE VALUATION METHODOLOGY AND THE FINANCIAL MODEL.
(PLEASE REFER TO THE DISCLOSURES AND DISCLAIMERS AT END OF THE DOCUMENT)

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Company overview

Company description

Fresenius Medical Care AG & Co. KGaA ("Fresenius Medical Care", "FME", or the "Company") is a global health care company providing products and services for patients with kidney disease, in particular dialysis care services and products for individuals with end-stage kidney disease ("ESKD"). Fresenius Medical Care is headquartered in Bad Homburg v. d. Höhe, Germany and is run by CEO and Chair Helen Giza since December 2022, having overtaken this position from Rice Powell. In 2022, FME generated revenues of EUR19.4bn, an EBITDA of EUR2.3bn (margin: 12.1%) and employed a headcount of 128,044 employees.

To treat its c. 344,687 patients with ESKD with lifelong dialysis, which requires c. 3 treatments per week (Locatelli et al. 2005, 285), around 4,116 outpatient dialysis centres, offering hemodialysis ("HD") treatments which use so-called HD machines and HD dialyzers for the cleaning of the blood, are operated globally. FME's dialysis clinics provide additional services for home-based dialysis patients, who typically receive peritoneal dialysis ("PD") treatments, using the patient's own peritoneum as a filter, or home HD treatments. The Company provides these patients with materials, training, and patient support services, including clinical monitoring, follow-up assistance, and arranging the delivery of supplies to the patient's residence. In 2022, FME conducted c. 52.3mn dialysis treatments, which resulted in health care services revenues of around EUR15.4bn or an average of EUR294.55 per treatment.

Dialysis is a complex treatment that requires trained health care professionals to administer it, and the cost of dialysis varies widely from country to country. Hence, the provision of dialysis treatments enforces the Company to be close to its patients and to employ adequate healthcare professionals, resulting in FME dividing the operations of its dialysis business into regional segments, namely North America, Europe, Middle East, and Africa ("EMEA"), Asia-Pacific, and Latin America.

Since its foundation in 1996 due to the merger of Germany-based Fresenius Worldwide Dialysis, a subsidiary of Fresenius SE & Co. KGaA ("Fresenius SE"), and US-based company W.R. Grace & Co., which solely operated its global dialysis business as National Medical Care, the Company has been the largest

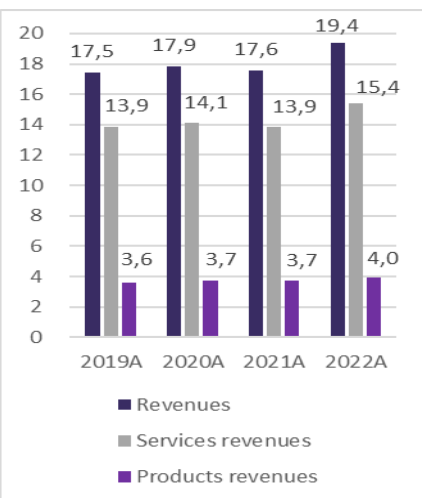


Figure 1: Revenues (EUR bn.)

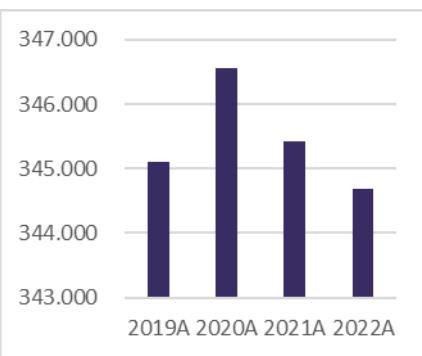


Figure 2: Dialysis patients.

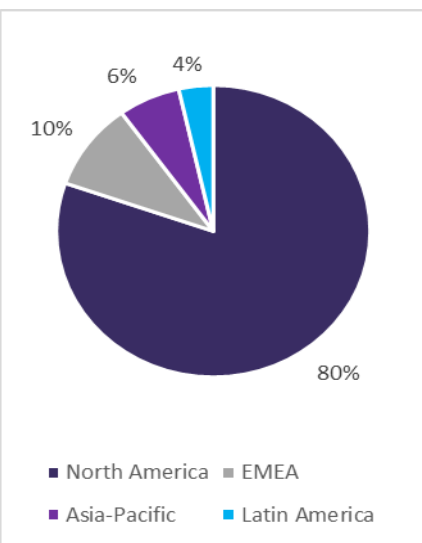


Figure 3: Dialysis services revenue split (avg '19-'22).

dialysis operator worldwide, treating around 119,000 patients in 2003 (FME history (1)). Based on publicly reported revenue and number of patients, the Company is the world's largest provider of products and services for individuals with kidney diseases, having a market share of around 8.8% in the total number of patients requiring dialysis treatments, while c. 50.0% of all dialysis patients globally use its dialysis products as of December 2022 (FME annual report 2022, FME capital markets day 2023). However, the number of dialysis patients treated by FME grew at an annual growth rate of c. 4.1% between 2010 and 2022, while worldwide patients increased at a CAGR of around 5.6%. This development resulted in a decrease of the Company's market share in dialysis patients from around 11.0% in 2011 to c. 8.8% in 2022. Only in 2011/ 2012, when Fresenius Medical Care conducted three M&A transactions, growth in the number of patients outpaced the global market: International Dialysis Centers was acquired for around EUR485mn, adding around 8,200 HD patients in Central and Eastern Europe and 70 dialysis centres (FME history (3)), Liberty Dialysis Holdings was acquired for an investment of c. USD1.5bn, adding c. 19,500 dialysis patients (FME annual report 2011) and around 201 dialysis clinics in the US (FME history (4)), and American Access Care was acquired for c. USD385mn, improving FME's capabilities to serve vascular access needs of dialysis patients (FME history (5)). Consequently, the number of dialysis patients increased by a CAGR of 9.8% in 2011 and 2012 compared to a CAGR of 6.7% in the global number of dialysis patients. Since these transactions, the number of patients treated by FME only increased by 2.9% p.a. compared to 5.4% of dialysis patients worldwide. Correspondingly, the global market share of Fresenius Medical Care decreased from 11.2% in 2012 to 8.8% in 2022 (FME annual reports 2011-2022).

To expand its product portfolio primarily for home HD patients, FME acquired NxStage Medical in 2019 (FME history (6)) for a consideration of approx. USD2.0bn. (FME history (7)). To combine capabilities in value-based care, FME merged its respective subsidiary into the InterWell Health brand in 2022, valuing it at around USD2.4bn and holding c. 75% of shares (FME history (8), FME annual report 2022).

In addition to these transactions, FME acquires dialysis centres. Going forward, management noted on the capital markets day in April 2023 that only minimal M&A activities are to be expected, indicating growth in its operations to stem from organic activities.

Shares and ownership

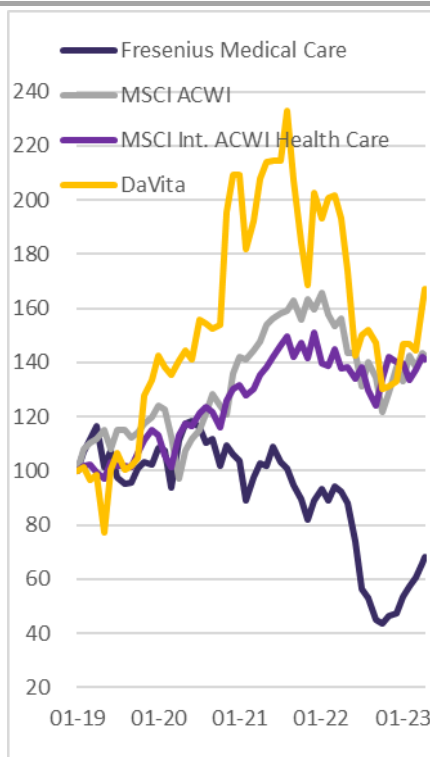


Figure 4: Comparison of share price performances.

	2021A	2022A
EV/ EBITDA	11,8x	10,6x
EV/ Dialysis patient	92.635x	71.794x
EV/ Dialysis centre	7.671.642x	6.012.280x
P/ E	17,3x	13,3x
Dividend payout-ratio	40,8%	48,8%

Figure 5: Valuation metrics FME.

	2021A	2022A
EV/ EBITDA	8,6x	8,2x
EV/ Dialysis patient	76.691x	64.452x
EV/ Dialysis centre	5.908.661x	5.136.894x
P/ E	12,8x	13,1x
Dividend payout-ratio	--%	--%

Figure 6: Valuation metrics DaVita.

Since its IPO in 1996, Fresenius Medical Care is listed on the Frankfurt Stock Exchange in Germany. Having been a member of Germany's blue chip index DAX almost consistently since December 1999, the Company is part of the MDAX (Mid-cap-DAX) since March 2023, which represents the 41st to 90th largest publicly traded corporations in Germany.

As of May 12th, 2023, the share price of Fresenius Medical Care is EUR43.76, resulting in a market capitalisation of EUR12.8bn. Based on FY22 financials, this represents a P/ E of 19.1x. In 2022, dividends per share decreased for the first time since 1997, amounting to EUR1.12 and representing a dividend pay-out ratio of c. 48.8%.

FME's shares are also listed on the New York Stock Exchange in the form of American Depositary Receipts ("ADRs"), where two ADRs represent one FME share. In 2022, the trading volume of ADRs increased by almost 50.0% compared to 2021 and ADRs accounted for around 50.0% of the total trading volume of FME shares and ADRs combined (FME annual report 2022). This suggests a growing interest among U.S. investors in FME which might be a result of its strong business in North America with around 2,683 dialysis centres.

Fresenius Medical Care is part of the Fresenius SE health care group, which holds a stake of c. 32.0%. In addition, Fresenius SE holds 100% of the shares of the Company's general partner, Fresenius Medical Care Management AG, meaning Fresenius SE is able to exercise de facto management control of Fresenius Medical Care. Fresenius SE is a Germany-based healthcare company that provides a broad range of products and services, including clinical nutrition, medical devices, hospital and medical care centre management, and construction of health care facilities, operating through the business segments Fresenius Medical Care, Fresenius Kabi, Fresenius Helios, and Fresenius Vamed. Fresenius SE is currently planning to deconsolidate its stake in Fresenius Medical Care. (Fresenius SE (1)) The Fresenius family still owns around 27.0% of the shares of Fresenius SE, and hence, indirectly c. 8.6% of FME, through the Else Kröner-Fresenius-Foundation (Fresenius SE (2)).

The largest fraction of shareholders of FME are based in North America, with institutional investors in the United States holding around 40.2% of the Company's shares (FME annual report 2022).

FME stock underperformed the MSCI All Country World Index, MSCI Int. Health Care Index, and its closest peer DaVita stock. This underperformance might be due to several reasons: i) Most importantly, FME was only able to grow its patient base by a CAGR of 1.4% between 2018 and 2022, compared to a CAGR of 4.3% in global dialysis patients and 2.1% in dialysis patients treated by DaVita. ii) The

large influence of Fresenius SE on FME might not be appreciated by investors.

iii) Due to Fresenius Medical Care’s underperformance compared to its closest peer DaVita, which mainly focuses on the U.S dialysis market (DaVita: 81.4% of patients based in the U.S. vs FME: 60.4%), investors’ aversion to other markets can be inferred.

Macroeconomic environment

Covid-19 pandemic

The Covid-19 pandemic, which erupted in early 2020, had severe effects on dialysis patients worldwide as the risk of infection complicated the execution of treatments in dialysis clinics. Due to being chronically ill, having on average ten to 12 co-morbidities (FME capital markets day 2023) and being frequently of advanced age (National Kidney Foundation (2)) (average age: 62.6 years (FME capital markets day 2023)), patients with ESKD were at elevated risk of lethal courses of a Covid-19 infections (Hsu and Weiner 2020).

Additionally, the Covid-19 pandemic resulted in increases in mortality rates, as exemplified by a decrease in life expectancy in the largest single market for renal care services, the United States, from 79.1 years in 2019 to 77.2 years in 2021 (Database earth (1)). As a result, the number of patients dependent on dialysis in the United States declined for the first time in the last 50 years in 2020 (National Kidney Foundation (1) 2022).

On a global scale, the negative impact of the Covid-19 pandemic on the dialysis business is unambiguous when comparing the annual growth rate in dialysis patients of 6.4% between 2011 and 2019 to a growth rate of 3.4% between 2020 and 2022 (FME annual reports 2011-2022).

According to the United Nations (2022), the Covid-19 pandemic is ceasing, which may result in positive effects on both the availability and willingness to receive in-centre dialysis treatments as well as life expectancy, with positive effects on dialysis operators due to expected increases in the dialysis patient pool.

Labour market

According to the WHO (2020), a global shortage of about 5.7 million nurses is projected for 2030, which might be particularly severe in emerging countries as more than 80% of nurses work in more developed countries, which account for

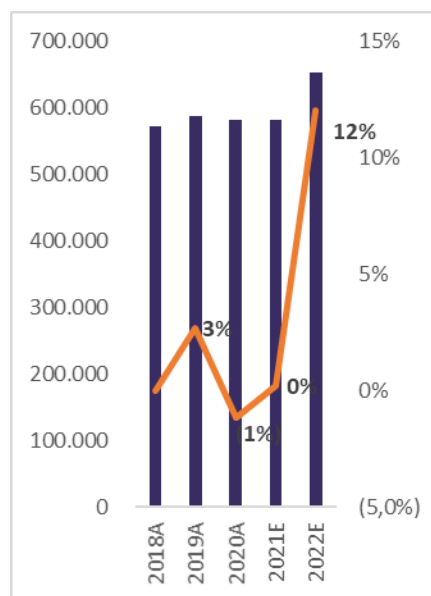


Figure 8: Dialysis patients in North America.

only 50% of the world's population. However, the developed countries are struggling as well with shortages in available nurses. In outpatient dialysis clinics in the United States, shortages in trained health care professionals with expertise in performing dialysis treatments are estimated to amount to 5%-7% of registered nurse positions per year since 2004 (Boyle et al. 2021). The Covid-19 pandemic further exacerbated shortages in care workers and nurses, mainly due to increased risk of infections and workload (National Kidney Foundation (1) 2022). Consequently, labour costs for health care services in the largest dialysis market, the United States, increased by around 16.0% between 2019 and 2022, and are expected to moderate but stay at elevated levels (Fleron et al. 2022) due to add-on payments and wage increases to incentivise health care workers (Checherita-Westphal 2022), of which three in ten considered quitting (American Hospital Association 2022). Additionally, contract labour, which charges higher hourly rates than regular health care staff, was increasingly used to mitigate the consequences of staff shortages (Dhar et al. 2022, Hughes 2022)

Increased personnel expenses due to the shortage of health care professionals resulted in negative effects on the profitability of health care operators, including dialysis care providers. Due to the ongoing shortage in the labour market for health care personnel, these negative effects are expected to continue.

Access to renal replacement therapy

According to Himmelfarb et al. (2020. 583), most people suffering from kidney failure worldwide waive dialysis treatments due to a lack of access to the health care system, resulting in millions of people dying each year from ESKD. An estimated number of 9.7mn people needed kidney replacement therapy in 2010, but only around 2.6mn were able to receive medical support, with expectations of this divergence to increase further in the future.

To demand life-saving dialysis services (and/ or kidney transplantations), access to the respective country's health care system is fundamental, which encompasses various factors, including the availability and affordability of health care services.

The availability of health care services is mainly influenced by the health care system's infrastructure, which depends on the country's development based on its GDP, evaluated by Moeller et al. (2002. 2075-2076) showing that the prevalence of ESKD in countries with GDP per capita below c. USD10,000 might be restricted due to insufficient access to the countries health care system. Global GDP per capita increased from USD10,674 in 2012 to USD12,875 in 2022 at an annual rate of 2.4% and is expected to growth at a CAGR of 4.1% until

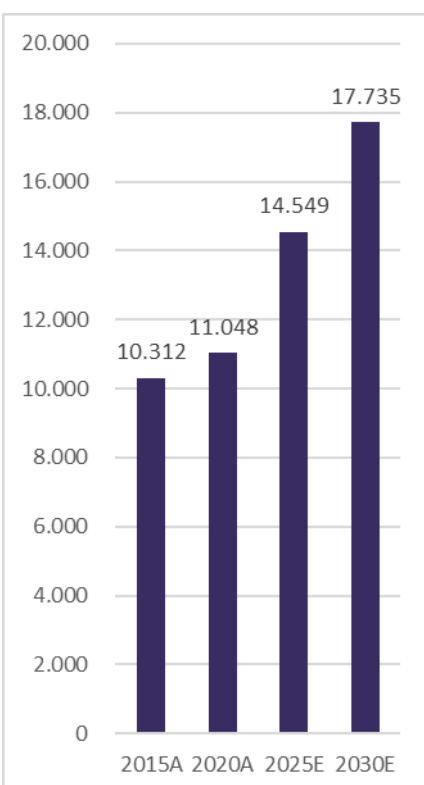


Figure 10: GDP per capita (PPP, USD).

2033, resulting in on average increased access of the worldwide population to the respective health care system around the world. However, the distribution of wealth, as measured by GDP per capita, and consequently the access to health care services varies around the world. Around 74% of countries worldwide have an appropriate health care system allowing at least 50% of people with kidney failure to consult dialysis services. However, Oceania and South-East Asia (c. 56% of countries), Africa (c. 42%), and South Asia (c. 14%) are below the average, while more than 90% of countries in the remaining regions supplying at least 50% of people with ESKD services (ISN 2023. 78).

In addition, there are large differences in the availability of kidney transplants globally. While the global average of the incidence of kidney transplants amounts to 12 per million population (“pmp”), it is mainly driven by high-income countries with a pmp of 29, which are located in Western Europe (42 pmp), North America (40 pmp), Central Europe (20 pmp), and the Middle East (15 pmp) (ISN 2023. 49). This large difference between high-income countries and the remaining countries results from the fact that around 93% of high-income countries use kidney transplants from both deceased and living donors, while the use of deceased donors decreases with income to low-income countries relying exclusively on living donors (ISN 2023. 72-74).

The treatment of ESKD, especially due to regular dialysis treatments, is very expensive as illustrated by the share of global health care expenditures for dialysis treatments exceeding the share of patients treated with dialysis by around 10 to 20 times (Vanholder et al. 2022). In Europe, annual reimbursements by governments increase with GDP per capita, up to EUR80,000 per patient, while the proportion of public health care expenses for dialysis treatments decreases with GDP (van der Tol et al. 2020, 981).

Dialysis market overview

As of December 2022, c. 4.824mn patients worldwide required renal replacement therapy (FME annual report 2022) as a result of end-stage kidney disease (“ESKD”). ESKD is the fifth and last stage of chronic kidney disease, implying a capacity of kidneys of 15% or less. To treat ESKD, patients either receive a donor kidney or lifelong dialysis treatments. While around 922,000 patients live with a kidney transplant, approx. 3.902mn ESKD patients require regular dialysis treatments (FME annual report 2022).

Driven by these patients, the global dialysis market volume amounted to c. EUR82bn in 2022 and can be divided into dialysis services volume (including

dialysis drugs) of around EUR67bn and dialysis products volume of approx. EUR15bn. The global dialysis market grew at an annual rate of 3.2% between 2018 and 2022, while the volume of dialysis services grew at 3.3% and products at 2.9% (FME annual reports 2017-2022). Going forward, Fresenius Medical Care expects the dialysis market to grow by 1%-3% per year (FME annual report 2022. 56).

In 2022, around 49,000 outpatient dialysis centres worldwide treated on average 80 patients per centre, offering in-centre hemodialysis and home-based dialysis, which is mainly conducted as peritoneal dialysis. These clinics are generally operated by trained health care professionals, such as nephrologists, registered nurses, and dialysis technicians. Dialysis centres are either owned and operated by public parties, private companies, or private individuals, such as nephrologists, which varies between countries and is influenced by the health care system's organisation into public or private commercialisation.

As of December 2022, a vast majority of 88.1% of global patients use in-centre HD, while home dialysis is mainly demanded in form of PD (11.3%), with home HD amounting to only 0.7% (FME annual report 2022). This distribution is driven by in-centre HD being available in c. 98% of countries, across all income group countries, as it is an established treatment modality of dialysis since many years with widely available and centralised infrastructure including equipment and trained medical staff and it reduces the complexity of having adequate living conditions and access to necessary equipment needed to enable home-based dialysis. In addition, PD is accessible in around 79% of countries worldwide, while home HD is usable only in around 50% of high-income countries while it is quasi non-existent for the remaining part of the world (ISN 2023. 72-74).

While HD and PD are comparable in terms of quality and success in treatments (Kwong and Li 2015; Karopadi et al. 2013), a global shift to home-based dialysis, in particular to PD, is to be expected due to its relatively lower cost of treating ESKD patients if low-cost PD equipment is available. In 2018, according to Cho et al. (2021. 319), “the median cost ratio of hemodialysis to PD was 1.08 [...], (while) PD costs were 2.8 times higher in HICs than LICs”. In the future, due to economies of scale, the cost of equipment, such as special bags needed for PD, can be further reduced, in particular compared to the cost of HD, as a result of local production and/ or lower duties on imports on PD equipment. Increased usage of less expensive PD treatments is needed to decrease health care expenditures. In addition, PD also enables treatments of patients in rural areas without centralised health care infrastructure (Karopadi et al. 2013).

North America

The North America dialysis market comprises the United States and Canada and consists of 832,490 ESKD patients in 2020. While 259,836 patients were living with a donor kidney, 581,654 people were receiving dialysis treatments. The North America dialysis market is the largest dialysis market worldwide, with the U.S. alone accounting for a volume of around USD22bn (Pockros, Finch, and Weiner 2021) or c. 34.9% of global dialysis services in 2018.

As of 2020, around 29.5% of ESKD patients in the U.S. (USRDS (1) 2022) and c. 30.1% of patients in North America (Canadian Institute for Health Information) were living with a donor kidney. Around 72% of donor kidneys stem from a deceased person while the remaining 28% were donated by a living person (Wang and Hart 2021. 1836). While the number of patients being treated with a kidney transplant increased by 32.5% since 2010, the proportion of these people as percent of the total ESKD population remained constantly between 29.6% and 30.3%. While there are around 138,844 people on the waiting list, only around 23,642 kidney transplantations were conducted in 2020 (OPTN/SRTR 2020), showing a large discrepancy between demand and supply of donor kidneys which cannot be expected to dissolve in the near-term future.

The growth in the number of dialysis patients in North America was 3.0% between 2010 and 2020, accelerating to 3.5% between 2015 and 2020 despite the Covid-19 pandemic, during which the number of dialysis patients in the U.S. contracted for the first time in 50 years (National Kidney Foundation (1) 2022).

With around 6,230 dialysis centres or 18.4 clinics pmp, North America (including the Caribbean) have the highest density of HD dialysis centres globally. In addition, with c. 5,802 clinics or a density of around 15.4 PD centres pmp, North America is among the leading regions according to density (ISN 2023. 72-74).

Due to its developed nature, the U.S. plays a pioneer in providing home-based dialysis treatments, which is demanded by c. 16.0% in 2022 and increased from c. 12.5% in 2019 (FME annual reports 2019, 2022). According to Flanagan et al. (2020), a presidential executive order targets 80% of ESKD patients to be treated with either a kidney transplant or home dialysis by 2025. Based on latest available information dated 2020 and provided by USRDS (1, 2022), c. 29.5% of ESKD patients received a donor kidney, c. 8.3% use PD, and 1.5% use home HD. The number of ESKD patients living with a kidney transplant constantly amounts to about 29% to 30% since 2005, meaning that the share of home dialysis in total dialysis treatments needs to be increased to around 50% from its current level 9.8%. To further enable home-based dialysis, the U.S. government health care organisation CMS introduced the concept of ESRD treatment choices in the beginning of 2021, resulting in increased support payments for home

dialysis (CMS (1)), which includes payments for home HD machines since 2022 (CMS (2) 2021).

The North America dialysis market is dominated by key players Fresenius Medical Care, which treats c. 208,310 patients and has a market share of 36.1% and DaVita, which treats c. 199,400 patients and has a market share of c. 34.5%. Consequently, the majority of dialysis centres are owned and operated by privately owned companies (FME annual report 2015).

Based on information provided by DaVita in its annual report 2022, average revenues per treatment of in-centre hemodialysis amount to USD347.79 while average revenues per home-based dialysis treatment amount to USD439.31 or 126.3% an in-centre HD treatment. Assuming this ratio for Fresenius Medical Care estimates average revenues per in-centre HD of EUR374.84 and of EUR473.49 for home-based treatments.

EMEA

EMEA is home to the second largest population of dialysis patients, which amounts to 880,840 and which grew at a CAGR of 3.7% between 2011 and 2022. These patients are treated in an estimated number of around 8,949 outpatient hemodialysis centres and 1,787 PD clinics, which are primarily based in Europe. Eastern and Central Europe has the third highest density of HD centres with around 10.5pmp and Europe has further 2.4 PD clinics per million population. In contrast, there are 0.8 HD clinics per million population in Africa and only 0.03 PD clinics per million population (ISN 2023. 72-74).

Most dialysis centres in EMEA are publicly operated (FME annual report 2015), resulting in a segmented dialysis market with the largest provider of services being Fresenius Medical Care with c. 66,063 patients, and unlisted players including Sweden-based Diaverum and Germany-based, non-profit organisation Kuratorium für Dialyse.

According to van der Tol et al. (2020. 979) the transplantation of kidneys to treat ESKD reached a peak in the years before 2020, meaning that this therapy will not be a threat to providers of dialysis services in the near future.

As of 2022, only around 7.0% of dialysis patients use home-based treatments, meaning this region is the slowest in adapting this possible treatment modality. However, the transition from in-centre HD to home-based dialysis could be enforced by "the limitations of healthcare resources" (van der Tol et al. 2020. 979).

Asia-Pacific

Around half of global dialysis patients or c. 2.0mn patients (FME annual report 2022) are living in the Asia-Pacific region, making it the largest region according to the number of patients resulting from its large population of c. 4.768bn people (United Nations, Department of Economic and Social Affairs, Population Division 2022) as of 2022. The dialysis patient pool experienced high growth, with the population having almost tripled between 2010 and 2022 (FME annual reports 2010-2022). Due to large differences in the development of its constituent countries, North and East Asia has the second highest density of dialysis centres worldwide with c. 12.0pmp, while South Asia has the second lowest (2.3pmp) (ISN 2023. 72-74).

Based on the prevalent number of PD patients and total dialysis patients in China, Hong Kong, Japan, Malaysia, Singapore, South Korea, and Thailand, around 11.9% of patients use PD while 88.1% use HD in 2018. However, the use of PD varies significantly, ranging from 74.6% in Hong Kong to 2.8% in Japan in 2018 (Kam Tao Li 2021). In the Asia-Pacific region, there is a limited access to the health care systems in many parts as evidenced by a low GDP per capita (PPP) of USD16,752 in 2022. To effectively treat its ever-growing population of ESKD patients, the use of PD can be assumed with an increasing GDP per capita.

The dialysis market in Asia-Pacific is very segmented and consists of few larger players, including FME, Nipro and unlisted, Germany-based B. Braun. Around half of dialysis centres are publicly operated, while c. 40% are operated by private persons, such as private nephrologists (FME annual report 2015).

Latin America

In Latin America, c. 339,311 patients require dialysis treatments. Patient pool grew by c. 3.9% annually between 2010 and 2022 with a slower growth rate of 3.3% between 2018 and 2022 due to the Covid-19 pandemic.

Around 60% of dialysis clinics are operated by private persons and the remaining centres are divided equally between public operators and companies (FME annual report 2015), resulting in a segmented dialysis market with the largest provider of services being FME, Baxter, and unlisted players including Sweden-based Diaverum.

Based on FME data, each dialysis centre in Latin America treats on average 149.4 patients, which is the highest number of patients per clinic worldwide.

Dialysis products

The market for dialysis products can be separated into hemodialysis products and peritoneal dialysis products. While most of the hemodialysis products market relates to HD machines and HD dialyzers used for hemodialysis, the peritoneal dialysis products market mainly consists of fluids and bags.

Key competitors

This report focuses on the listed key competitors of Fresenius Medical Care due to data availability constraint for non-listed players. However, it must be noted that there are also privately-owned corporations, such as Diaverum and B. Braun, and non-profit organisations, including Kuratorium für Dialyse, involved in the provision of dialysis care services, which treat around 20,000 to 40,000 dialysis patients and are active mainly in the EMEA, Asia-Pacific, and Latin America region.

▪ DaVita

US-based DaVita provides exclusively dialysis care services for around 245,000 patients, of which c. 81.4% are based in the United States. While FME could only increase its patient pool by a CAGR of 0.8% from 2019 to 2022, DaVita was growing faster at 1.8% per year. Growth in its patients was driven by its patient pool outside the U.S., which increased from 12.2% to 18.6% of total patients.

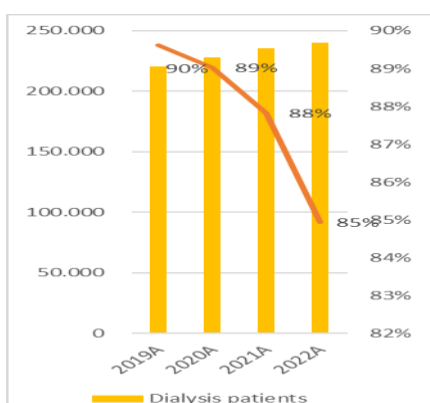
▪ Baxter

Baxter is based in the United States Baxter provides a broad range of health care products and services across general health care, kidney care, nutritional care, and respiratory care. Its kidney care business focuses on the provision of dialysis products for peritoneal dialysis as well as dialyzers for in-centre hemodialysis (<https://www.baxter.com/healthcare-professionals/kidney-care>). Baxter is particularly strong in manufacturing PD products, which resulted in market share of around 72% in 2016 (FME annual report 2016) in this category. Based on this core competency and expected rising demand for PD products, Baxter is focusing on providing these products in developing countries with the target to double the number of patients using its PD products (<https://www.baxter.com/patients/kidney-care>). In addition, Baxter provides services and support for PD patients, which includes deliveries of equipment needed for PD. In 2022, Baxter generated around EUR3.7bn or 24.8% of its total revenues due to sales of renal care products.

▪ JMS

	2019A	2020A	2021A	2022A
Revenue growth	(0,1%)	1,4%	0,6%	(0,1%)
Gross profit margin	25,1%	25,3%	22,5%	22,9%
EBITDA margin	20,8%	20,0%	21,1%	17,6%
EBIT margin	15,4%	14,5%	15,2%	11,3%
Net margin	8,0%	8,7%	10,4%	6,6%
ROIC	8,6%	8,9%	10,8%	7,5%
Capex/ Revenues	n.a.	5,4%	5,0%	4,2%

Figure 11: Operating metrics DaVita.



	2020A	2021A	2022A	2023A
Revenue growth	26,7%	26,2%	24,5%	22,9%
Gross profit margin	9,3%	9,3%	7,4%	6,7%
EBITDA margin	3,9%	3,6%	1,6%	1,1%
EBIT margin	3,3%	3,0%	1,4%	40,0%
ROIC	4,1%	3,5%	1,7%	0,6%

	2019A	2020A	2021A	2022A
Revenue growth	2,4%	2,7%	9,5%	18,2%
Gross profit margin	42,4%	39,7%	40,3%	35,8%
EBITDA margin	23,8%	22,8%	23,4%	21,0%
EBIT margin	16,8%	15,8%	16,4%	11,7%
Net margin	7,1%	9,5%	10,1%	n.a.
ROIC	8,8%	8,7%	6,8%	n.a.

Figure 13: Operating metrics Baxter.

	2020A	2021A	2022A	2023A
Revenue growth	0,9%	(1,7%)	1,0%	9,6%
Gross profit margin	26,7%	26,2%	24,5%	22,9%
EBITDA margin	9,3%	9,3%	7,4%	6,7%
EBIT margin	3,9%	3,6%	1,6%	1,1%
Net margin	3,3%	3,0%	1,4%	40,0%
ROIC	4,1%	3,5%	1,7%	0,6%

Figure 14: Operating metrics JMS.

▪ Nipro

	2020A	2021A	2022A	2023A
Revenue growth	3,8%	2,9%	8,6%	10,2%
Gross profit margin	30,9%	30,9%	30,6%	29,9%
EBITDA margin	15,4%	14,8%	14,0%	12,1%
EBIT margin	5,9%	5,4%	4,7%	3,2%
Net margin	(2,6%)	3,3%	3,0%	1,0%
ROIC	n.a.	2,5%	2,1%	0,7%

Figure 15: Operating metrics Nipro.

Japan-based JMS is a manufacturer of medical equipment and drugs with a particular focus on infusion and transfusion products. In addition, its broad product offering includes dialysis products, surgical treatment solutions, and blood cells. Dialysis products manufactured by JMS mainly consist of HD machines and solutions for PD and are mainly used by dialysis patients based in Japan (<http://www.jms.cc/english/jms/jms02.html>). Due to improving health care systems and an increasing dialysis patient population, JMS targets to increase its sales of dialysis products in Asia (<http://www.jms.cc/english/jms/jms04.html>).

In 2022, JMS generated total sales of c. 434mn, of which around 31.7% relate to renal care products.

Nipro is a Japan-based manufacturer of medical devices, pharmaceutical products, solutions related to pharma packaging and regenerative medicine. Within its medical device business, Nipro manufactures renal care products for hemodialysis (<https://nipro.com/products/renal/>), with an emphasis on dialyzers for HD resulting in “one of the largest shares of the world market” (<https://www.nipro.co.jp/en/business/device/renal.html>). In addition, Nipro operates dialysis centres and provides dialysis care services in around 146 clinics, mainly in countries in South and Central America and Asia.

In 2022, Nipro generated around 26.9% of its total revenues of EUR3.4bn due to sales of renal care products.

Key drivers of the dialysis market

The main driver of revenues related to the provision of dialysis is the number of treatments conducted per year, which is a function of the number of patients requiring dialysis.

The dialysis market is driven by the number of people with ESKD which require ongoing dialysis. These patients demand regular dialysis treatments, which are performed using always a machine in case of hemodialysis and might use a smaller machine in case of peritoneal dialysis.

With the available data, it was only possible to project the development of the number of dialysis patients in EMEA, Asia-Pacific, and Latin America, while it was feasible to forecast the ESKD patient population in North America.

The patient pool of people suffering from ESKD is increasing rapidly as demonstrated by a CAGR of 5.6% between 2011 and 2022, resulting in the number of global dialysis patients almost doubling to around 3.9mn.

The underlying causes differ between developed and emerging countries. On one hand, the increase in dialysis patients in North America and Europe is driven by social trends, such as an aging population (Denic et al. 2016), due to negative effects of ageing on kidneys in general and increase in the prevalence of lifestyle disease, e.g., diabetes and hypertension, which usually precede dialysis and are caused by unhealthy diets comprising too much sugar and salt and a lack of regular exercise (Lea and Nicholas 2002. 7). On the other hand, strong population growth and wealth improvements, with positive effects on the access to health care including dialysis services and consequently rising diagnostics of ESKD, mainly drive the dialysis patient pool in emerging countries. A common risk factor for kidney disease in all regions is obesity (Source – Jette).

The regressions described below include the 2023 forecast of the number of dialysis patients in EMEA, Asia-Pacific, and Latin America of Fresenius Medical Care, as this short-term view is expected to be reliable.

North America

The demographic change is evident when comparing life expectancies over time. Even though the life expectancy in North America decreased from 79.5 years in 2019 to 78.7 years in 2022 due to excess mortality caused by the Covid-19 pandemic, it is expected that it will increase up to 81.6 years in 2033 (Database earth USA and Canada). Consequently, the population, which is most likely to be affected by ESKD due to negative effects of ageing on the kidneys, people aged 75 years and older will increase from c. 27.1mn or c. 7.2% of total population as of 2022 to around 42.8mn or around 10.7% in 2033 (United Nations, Department of Economic and Social Affairs, Population Division. 2022). This large increase of almost 60% in the number of people most vulnerable is expected to be the key driver in the growth of ESKD patients. Elderly people, age 75 and older, are expected to drive the population of dialysis patients, as this age group is the “fastest growing segment of the incident ESRD population” according to Schmidt (2012), and are often not available for kidney transplants due to various comorbidities.

The daily lifestyle of most people consists of an unhealthy diet with too much sugar and salt and at the same time too little exercise. As a result, the number of people with severe obesity, meaning with a body mass index (“BMI”) of 40 and above, will increase from 29.7mn in 2022 to c. 42.8mn in 2032.

	Coefficients	P-value
Population - 75 years and older	0,02	0,00
Severe obesity (BMI >= 40) population	0,01	0,00
Adjusted R Square	1	
Observations	20	
Correlation - Population & obesity	0,99	

To forecast the number of ESKD patients in North America, a regression using the explanatory variables *Population with Age 75 Years and Older* and *Severe Obesity Population* is conducted from 2000 to 2021. As can be seen in figure on the left, both variables have a positive impact on the ESKD population, which is expected to grow from 835,700 in 2021 to 1,388,784 in 2032 at an annual growth rate of 4.7%.

The treatment with the best outcome for ESKD is the reception of a kidney transplant (Wang and Hart. 2021. 1836). As of 2020, around 29.5% of ESKD patients in the U.S. (USRDS (1). 2022.) and c. 30.1% of patients in North America (Canadian Institute for Health Information.) were living with a donor kidney. Around 72% of donor kidneys stem from a deceased person while the remaining 28% were donated by a living person. While the number of patients being treated with a kidney transplant increased by 32.5% since 2010, the proportion of these people as percent of the total ESKD population remained constantly between 29.6% and 30.3%. While there are around 138,844 people on the waiting list, only around 23,642 kidney transplantations were conducted in 2020 (OPTN/SRTR. 2020.). Considering the steady share of ESKD patients living with donor organs as well as the large discrepancy between available kidney donors and people on the waiting list, it can be expected that the population of ESKD patients living with kidney transplants remains at around 30.2%.

According to a U.S. presidential executive order (Flanagin et al. 2020.), the share of people living either with kidney transplants or using home-based dialysis is targeted to reach 80% by 2025. With the expectation of kidney donors to amount to c. 30.2% of ESKD patients, the share of patients receiving home-based dialysis needs to be increased from currently 16% to around 49.8% to reach the target. While CMS supports home-based dialysis due to increased reimbursements, it seems to be realistic for home dialysis to reach 50% of total dialysis patients by 2032, which equates to a strong increase in the share of home dialysis of 12.1% per year. This results in around 65.1% of ESKD patients to be treated with either kidney transplants or home dialysis.

EMEA

The region EMEA comprises very different countries in terms of level of development as demonstrated by a GDP per capita (PPP) of USD8,277 in Africa and USD34,996 in Europe in 2022. As a result, there are large differences in the health care systems, which are in particular evident due to differences in the density of dialysis centres, ranging from 0.8pmp in Africa to 10.5pmp in Europe. For the estimation of the value driver number of dialysis patients, the

development in EMEA is assumed to be driven by the underlying trends prevalent in Europe, particularly in the developed countries in Western Europe.

Due to the developed nature of the European economy and health care system, growth in dialysis patients is driven by an aging population. Due to an increase in the life expectancy from 67.4 years in 2022 to 69.9 years in 2032, the population above 75 years is assumed to increase from c. 80.3mn to around 106.6mn, which will consequently influence the number of people requiring dialysis treatments. Another key driver of the dialysis patient pool are unhealthy lifestyles which will harm body as well as kidney function and can be expressed by the obesity, meaning a BMI exceeding 30. The population with obesity will increase from about 466.6mn in 2022 to c. 714,600mn in 2032. This huge increase is impacted by enhancements in the development level of many African countries, expressed by GDP per capita (PPP) in Africa almost doubling to c. USD15,449 in 2032.

	Coefficients	P-value
Population - 75 years and older	0,00	0,00
Obesity (BMI >= 30) population	0,00	0,00
Adjusted R Square	1	
Observations	14	
Correlation - Population & obesity	0,93	

Figure 17: Regression output - EMEA.

Based on the identified drivers, a regression of the *Population with Age 75 Years and Older* and *Obesity Population* on the number of dialysis patients in EMEA from 2010 to 2023 is conducted. Both the population of elderly people as well as obesity population have a positive coefficient in the conducted regression. As a result, the number of dialysis patients is expected to grow from 907,265 in 2023 to 1,314,796 in 2032, representing an annual growth rate of 4.2%.

Asia-Pacific

Based on the young population living in Asia-Pacific, and of which around 28.1% are younger than 18 years (compared to 18.9% in Europe and 21.8% in North America) (United Nations, Department of Economic and Social Affairs, Population Division. 2022.), and an ongoing strong growth in the population of 0.9% between 2010 and 2022, the total number of people living in this region is considered to be a key driver in the number of dialysis patients. In Asia-Pacific, the population is expected to grow from 4.768bn to 5.056bn in 2032.

As diagnostics of diseases might be limited due to a GDP per capita (PPP) of around USD16,752, access to the health care system is the second driver in the dialysis patient pool, which is approximated by inhabitants per hospital. Due to improvements in the level of development demonstrated by an annual growth rate in the GDP per capita (PPP) of c. 5.7% until 2032, availability of the health care system can be enhanced, resulting in a decrease in inhabitants per hospital from in 57,523 in 2022 to 57,447 in 2032.

Additionally, the number of obese people, which incorporates ongoing trends towards unhealthy lifestyles with negative effects on the body's organs, is driving

	Coefficients	P-value
Population - 75 years and older	0,00	0,00
Inhabitants / Hospital	(41,07)	0,00
Obesity (BMI >= 30) population	0,00	0,00
Adjusted R Square	0,91	
Observations	14	
Correlation - Population & inhabitants / h.	(0,99)	
Correlation - Population & obesity	0,98	
Correlation - Inhabitants/h. & obesity	(0,95)	

ESKD patients and will increase in Asia-Pacific by c. 76.5% to around 556,600,000 people in 2032.

To forecast the number of dialysis patients in Asia-Pacific, a regression using the explanatory variables *Population*, *Inhabitants per hospital*, and *Obesity Population* from 2010 to 2023 is conducted. The number of people living in the Asia-Pacific region as well as the obesity population are estimated to have a positive impact on the dialysis population, while inhabitants per hospital have a negative one. A negative coefficient for inhabitants per hospital emphasises that a decrease in the number of people visiting a hospital, which favours an increased access to the health care system as measured by the number of hospitals, results in an increase in dialysis patients which might be due to improved diagnostics and availability of health care services.

Based on this regression, the number of dialysis patients is expected grow at a CAGR of c. 4.2% from 2,094,255 in 2023 to 3,033,981 in 2032.

Latin America

As of 2022, the development of Latin America, as measured by GDP per capita (PPP) of USD16,757, is comparable to Asia-Pacific. Consequently, improvements in the development of the economy and health care system are expected to increase the number of people with ESKD because of enabled possibilities to diagnose this disease.

Additionally, Latin America’s population grew at a rate of 1.1% per year between 2010 and 2022, even faster than the population in the Asia-Pacific region. Population growth will continue at a CAGR of 0.7% until 2023, thereby driving the number of patients requiring dialysis treatments.

The risk factor obesity was excluded from the regression due to multi-collinearity between the population and the number of obese people in Latin America.

To estimate future dialysis patients, the *Population* and *GDP per capita, current prices (PPP, USD)* are used as explanatory variables in a regression using the period 2010 to 2023. As can be seen in figure on the left, the population has a negative coefficient, while GDP per capita has an positive impact on the ESKD population, which is expected to grow from 352,883 in 2023 to 505,856 in 2032 at an annual growth rate of 4.1%.

	Coefficients	P-value
Population - 75 years and older	(0,00)	0,77
GDP per capita, current prices (PPP)	21,86	0,00
Adjusted R Square	0,91	
Observations	14	
Correlation - Population and obesity	0,86	

Figure 19: Regression output - Latin America.

Forecasting rationale

Revenues

To forecast revenues of Fresenius Medical Care, a bottom-up approach is used based on the number of treatments, breakdown of the patients' use of in-centre hemodialysis and home-based dialysis, and an average treatment per modality.

The key drivers of revenue generation of health care services operations are the number of dialysis treatments conducted, which depends primarily on the number of patients treated, as well as the average revenue per dialysis treatment.

Due to the absence of exact numbers of FME, the number of average treatments per patient in the historical period is assumed to be the number of treatments divided by total patients per region, independent of the treatment modality received. For the forecasted period, average treatments per patient are expected to converge to the ideal state of three (in-centre HD) treatments per week. In addition, the type of treatments conducted is simplified into in-centre HD and PD, with the latter comprising all home-based dialysis patients due to data constraints and immateriality.

As there is no information provided by FME related to the split of its patients into in-centre-based and home-based for EMEA, Asia-Pacific, and Latin America, the regional average prevalence of these modalities is assumed for Fresenius Medical Care in the historical period.

Due to data constraints, reimbursements per treatment in each geographic region cannot be evaluated in detail per patient insured by a public or governmental, respectively, and private or commercial, respectively, organisation. and privately insured patients. This caveat makes a reliable estimate of future average revenues per treatment difficult as this depends primarily on payor mix of patients (public vs private).

Due to data constraints regarding split into HD and PD centre

In the largest dialysis market global, the U.S., the reimbursement rate is set by governmental insurers, such as Centers for Medicare and Medicaid Services, and grew by 3.1% between 2019 and 2022, while inflation averaged 4.1%. Due to a highly regulated environment and expectations of the public towards an affordable health care system, average revenue per in-centre treatment is estimated to grow by 3.0% in 2023 based on rates set by CMS and at around 1.0% below inflation as measured by HICP afterwards, in all regions.

▪ Dialysis services revenues in North America

The number of dialysis patients decreased from 211,064 in 2019 to 2022 to 208,310 patients, mainly due to the Covid-19 pandemic, which were supported by 2,683 dialysis centres and of which around 84% received in-centre dialysis treatments, while the remaining 16% received home-based dialysis.

After the number of average dialysis patients per dialysis centre fell from 81.8 in 2019 to 77.6 in 2022, it is expected to rebound supported by a strongly increasing number of dialysis patients. In 2027, around 3,304 clinics will treat an average of 82.9 patients per centre, resulting in total dialysis patients in North America of 251,591. Based on the ongoing strong trend regarding home-based dialysis in North America, FME targets 25%, or around 62,868, of its patients to be treated in a home setting by 2027. The other 188,693 patients will be treated in outpatient clinics by then. Until the end of the projection, the share of home-based dialysis patients will grow at its '20-'27 average.

Based on data provided by DaVita, home-based dialysis treatments in the U.S. were charged on average at 126.3% of the reimbursement for in-centre HD treatments. For FME, this equates to a charge of EUR374.84 per in-centre HD treatment and EUR473.49 per home treatment. To further induce home treatments by incentivising dialysis operators to market these treatments, this ratio can be expected to stay at this level until 2027 which subsequent reductions to 100.0% until 2033. As a result of 1.0% growth below inflation, average revenues per in-centre treatment increases to EUR440.56 in 2032, which corresponds to average revenues per home treatment by then.

Considering the increasing share of home-based patients and the currently higher reimbursement rate for these patients, North America services revenues are growing strongly at a CAGR of 6.8% until 2027, which decreases to 3.2% from thereon until 2032 due to decreasing revenues per home treatment.

▪ Dialysis services revenues in EMEA

After dialysis patients decreased from 66,217 in 2019 to 66,063 in 2022, Fresenius Medical Care will increase its dialysis centres from around 795 to 940 in 2032 to profit from slow adaptation of home-based dialysis in this region. Additionally, the average number of patients per centre will be increased and surpass the 2019 average of 84.8 primarily due to rising home usage, resulting in an increase of dialysis patients to 81,315 by 2032.

Based on Cho et al. (2021. 319), HD treatments were assumed to generate 108.0% of revenues of PD or home-based dialysis treatments, respectively. Consequently, FME charged EUR147.23 for HD and EUR136,32 for home dialysis per treatment in 2022. Considering the ongoing large health care expenditures including expenses for dialysis, a convergence of home-based reimbursement rates to in-centre rates is to be expected by 2032, to incentivise home dialysis due to its relatively lower costs in the long-term.

▪ Dialysis services revenues in Asia-Pacific

Between 2019 and 2022, the number of dialysis centres decreased from 400 to 395 while the number of dialysis patients treated by Fresenius Medical Care increased from 33,005 to 34,001 at an annual rate of c. 1.0%, resulting in an increase in average patients per dialysis centre from 82.5 to 86.1. Considering management’s announcement of reducing the global footprint of the Company by around 25% to 60% to focus on profitable regions with high reimbursement rates (CMD 2023. 47), around 1.0% new dialysis centres are to be opened per year, which focus on providing in-centre dialysis treatments.

In-centre patients are therefore expected to increase from 28,967 in 2022 to 33,544 in 2032. While these patients received c. 2.7 treatments per week in 2022, the weekly rate will increase to around 3.0 treatments in 2030 to provide better medical support. Average revenue per treatment increased from 2019 to 2022 to EUR200.09 and is expected to further increase at a CAGR of 1.92%, which is equivalent to growth of 1.0% below inflation.

While home-based dialysis, in particular peritoneal dialysis, will gain in importance mainly due to the possibility of treating patients in rural areas without adequate health care infrastructure as well as decreasing costs of providing these treatments with increasing development of the health care system, FME is not interested in being a key player for these patients due to expectations of revenues per treatment decreasing from 189.55 in 2022 to EUR153.09 in 2033. Revenues per treatment are estimated as ratio to revenues per in-centre HD treatment based on Karopadi et al.’s (2013) evaluation of differences of costs between HD and PD in 17 developed and 5 developing countries with the result, that the cost of HD is around 1.25x to 2.35x the cost of PD. To simplify, reimbursements per PD treatment are estimated as being halfway in-between these ratios, or c. 61.3% of in-centre HD treatments. Consequently, FME will decrease the share in PD patients of total dialysis patients in Asia-Pacific from 14.8% or around 5,034 in 2022 to 10.0% or 3,727 in 2032.

▪ Dialysis services revenues in Latin America

Average revenues per treatment amount to EUR96.54 in 2022 in Latin America which was much lower than in North America (EUR390.63), Asia-Pacific (EUR202.46), or EMEA (EUR146.46). For that reason, dialysis centres in Latin America treat on average 149.4 patients, of which around 131.9 are in-centre HD patients. Compared to closest comparable region Asia-Pacific in terms of general development of the health care system, this is amounts to around 1.7.

Due to the relatively low reimbursement rates compared to other regions as well as management’s announcement of increased focus on profitable regions with higher reimbursement rates, FME will invest in 2 dialysis centres per year,

resulting in an increase from 243 in 2022 to 263 in 2032. Additionally, average patients per clinic will be increased to c. 160.0 from 2030 on, to compensate for lower reimbursement rates.

As the ratio of HD to PD is expected to behave as in the Asia-Pacific region to enable a growing population of ESKD patients to be treated, FME targets to serve only 5% or c. 2,104 of its dialysis patients in Latin America with peritoneal dialysis, while the remainder is treated in outpatient dialysis centres.

▪ Dialysis product revenues

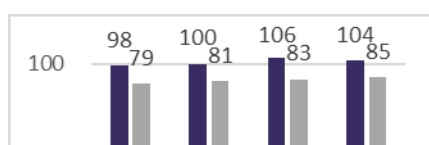
Due to data constraints in term of figures related to product offerings sold to third-party customers as well as pricing, the Company’s revenues from health care products depend on the number of dialysis patients which use either hemodialysis or peritoneal dialysis.

Hemodialysis products sold by FME are primarily driven by the number of HD patients that are not treated with dialysis care services by Fresenius Medical Care. In 2022, revenues amounted to EUR1.1k per externally treated patient or around 3.8 these patients’ reimbursement rate. The ratio to average revenues per HD treatment is expected to rebound to c. 4.2 (average `19-`22). As a consequence, average revenues per externally treated HD patient increase to EUR1.3k by 2031.

In 2022, around 15.0% of global PD patients, including patients treated with own dialysis care services, used PD products manufactured Fresenius Medical Care. This market share will remain constant until 2032. Similarly, revenues of PD products are mainly driven by the number of external PD patients. In 2022, revenues amounted to EUR14.0k per externally treated patient or around 37.1 time the average revenue per PD treatment. The latter was significantly higher between 2019 and 2021 (48.9) and is expected to converge to this ratio due to assumed strong demand for PD products, such as bags and fluids, due to its increased usage. Consequently, average revenues per externally treated PD patient increase to EUR20.1k by 2031.

Operating performance and margin development

While the EBIT margin amounted to 11.7% in 2019, it declined to 7.0% in 2022, mainly due to the negative effects of the Covid-19 pandemic. In addition, the provision of dialysis services in outpatient dialysis centres is very labour intensive, with c. 100,000 employees or around 72.9% of total staff working in clinics. Due to ongoing labour shortage for trained health care professionals, these employees have a strong bargaining position in the coming year, which will result in increased expenses for the services employees. Consequently, the EBIT



margin is expected to further decline down to 4.8% in 2024, from where it will steadily increase to around 7.5% starting in 2029.

Capital expenditures

Capex mainly relate to dialysis clinics operated by FME, and amounted to 3.9% to 6.5% of revenues between 2020 and 2022. To enable large increases in the number of dialysis patients from 344,687 in 2022 to 457,100 in 2032, FME will increase its dialysis centres from currently 4,116 to 4,983 in 2032. As a result, Capex will amount to above 7% in 2023 and 2024 and decrease constantly to c. 5.7% in 2032.

Net working capital

Average days sales outstanding of 71.3 days in 2022 can be expected to increase to 75.0 in 2029 to approach peers DSO of 80.2 due to the regulated environment in which FME operates which most payors of its dialysis care services being either governmental or commercial insurers.

Below industry average days payables outstanding of 23.6 days in 2022 are assumed to approach peers DPO of 26.9, with expectations of 25.0 days in 2029.

Average days of inventory outstanding of 56.1 days in 2022 can be improved to its pre-pandemic level of 31.8 days in 2029, thereby approaching peers DIO of 31.1.

Due to approximations in DSO, DIO, and DPOs to FME's key peers, the cash conversion cycle will improve from 103.8 days in 2022 to 97.3 days in 2029 and thereafter.

Capital structure

Between 2019 and 2022, net debt as percent of FME's EV increased from 26.5% to 49.8%. Considering an average ratio of 39.6%, a net debt / enterprise value ratio of 40.0% is targeted.

Dividend pay-outs

While its dividend pay-out ratio increased from 40.8% to 48.8% in 2022, Fresenius Medical Care decreased its dividends per share for the first time in its history from EUR1.35 in 2021 to EUR1.12 due to the negative impact of the Covid-19 pandemic and ongoing labour shortages, resulting in an increase of c. 15.9% in the average wage per employee, on the Company's operations. Based on the targeted capital structure, FME will pay-out a dividend of EUR1.32 per share in 2023, representing an increase of c. 18.1% compared to 2022.

Figure 20: Cash conversion cycle.

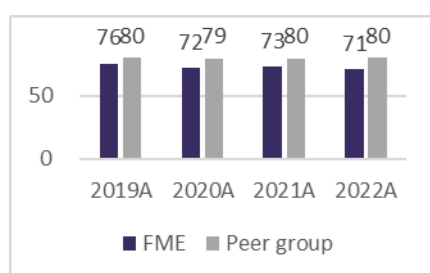


Figure 21: DSO.

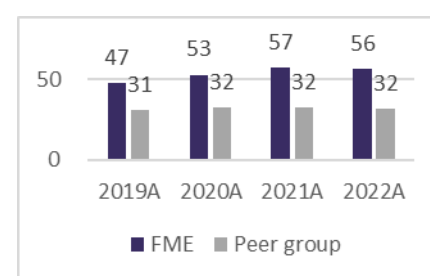


Figure 22: DIO.

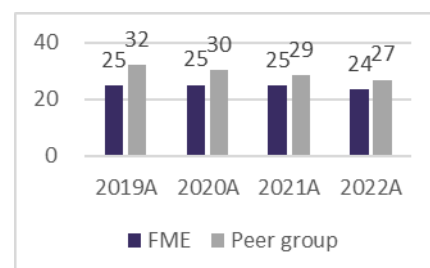


Figure 23: DPO.

Intrinsic valuation

To estimate the enterprise value of Fresenius Medical Care AG & Co. KG, the discounted cash flow method (DCF) is chosen. The explicit forecast period ranges from 2023 to 2032 and the perpetuity is approximated due to the calculation of a terminal value.

Enterprise value – equity value – bridge

Forecasting cash flows of Fresenius Medical Care and discounting these at the weighted average cost of capital of 4.2% yields an enterprise value of EUR36.6bn as of December 31st, 2023. To estimate the share price of FME, debt equivalents of c. EUR1.3bn, net debt of EUR14.7bn and non-controlling interest of EUR1.5bn need to be deducted, arriving at an equity value of FME shareholders of EUR19.2bn or a share price of EUR65.43.

NCI is approximated using book values due to data constraints of various consolidated but not fully owned subsidiaries.

Weighted average cost of capital

To value the share price of Fresenius Medical Care, the Company's future cash flows are discounted at a weighted average cost of capital of 4.2%. The weighted average cost of capital is based on a cost of equity of 5.2%, post-tax cost of debt of 2.77% and a target net-debt-to-enterprise value ratio of 40% and a corresponding equity-to-enterprise value ratio of 60%. The target capital structure of FME corresponds to averaged leverage between 2019 and 2022.

▪ Cost of equity

Fresenius Medical Care has a cost of equity of 5.2%, which is based on the capital asset pricing model (“CAPM”).

To estimate the Company's levered beta, a regression of the stock returns of FME on the index returns of the MSCI All Country World denominated in US Dollar, which represents a broadly diversified global equity index, is chosen. The index is denominated in US dollar as the majority of FME's shareholders are based in the United States, and hence, can be reasonably considered to invest their money in USD. A regression is chosen on the rationale that a beta approximation based on historical stock prices or returns, respectively, is more precise than based on a peer group analysis as Fresenius Medical Care is a mature and stable company. Further, due to large differences in business model

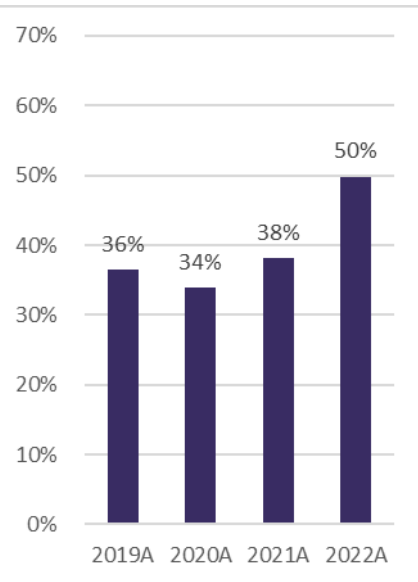


Figure 24: Historical leverage of FME.

and size, it cannot be assumed that the peer group is comparable in terms of systematic risk. An estimation window of five years is chosen as it is assumed that this time frame is long enough to capture the systematic risk of FME and still short enough to reflect current market conditions. Both the Company's and the Index's returns are based on weekly price data to reduce the daily return's noise which is prevalent due to short-term fluctuations. P-value of c. 0.00 and standard error of c. 0.09 confirm the statistical relevance of the conducted regression.

The regression estimates a levered beta of 0.55 and is un-levered using Fresenius Medical Care's current equity-to-enterprise value ratio of 51.0% (debt as of 31/12/2022; market capitalisation as of 12/05/2023) and corresponding debt-to-enterprise value ratio of 49.0% as well as a debt beta of 0.10, which corresponds to the Company's BBB credit rating. The asset beta of 0.33 is re-levered with the above-mentioned target capital structure, resulting in a levered equity beta of 0.49.

The risk-free rate used in the CAPM is based on the yield-to-maturity of German 10-year government bonds of 2.27% as of May 12th, 2023.

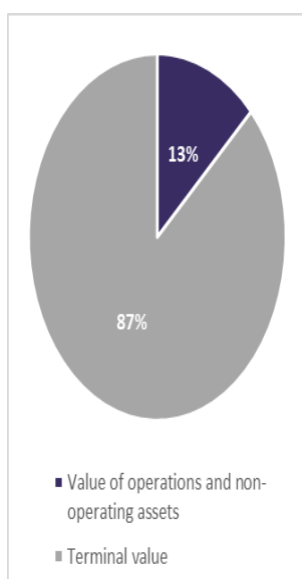
The equity risk premium used in the CAPM for the Germany equity market is based on an estimation provided by Damodaran and amounts to 5.94% as of January 05th, 2023 (Damodaran 2023).

■ Cost of debt

Fresenius Medical Care has an after-tax cost of debt of 2.77%. The Company's cost of debt is based on the yield-to-maturity of its outstanding 3.875% coupon bond of 4.00%, the average default rate of bonds of Baa3-rated corporations with a maturity of approx. 4 years of 1.35% (Moody's Investors Service (1) 2018), and a loss given default rate of 46.10% (Moody's Investors Service (1) 2018). Corporate tax rate of 28.075% comprises both statutory corporate income tax rate of 15.825% (including solidarity surcharge of 5.50%) (Deloitte 2020) and trade tax of 12.25%. Trade tax is based on a base rate of 3.50% (PWC 2022) and a municipal tax rate ("Hebesatz") of 350% in Bad Homburg, Germany (Hessischer Industrie- und Handelskammertag).

Terminal value

The terminal value of Fresenius Medical Care cash flows is based on a long-term growth rate of 2.0%, which results from the Company's reinvestment rate of 42.6% and a ROIC of 4.7% in the last explicitly forecasted financial year 2032. Around 87.0% of the enterprise value results from the Company's terminal value, stating that most of FME's value is generated far in the future.



Sensitivity analysis

To evaluate the impact of changes in key assumptions on the enterprise value, a sensitivity analysis on the following key inputs is conducted.

To analyse changes in the cost of equity due to changes in the levered beta estimated by regressing the Company's stock returns on the MSCI All Country World's returns, the estimated beta of 0.55 and betas in the range of +/- 2 times the standard error of 0.09 are evaluated, resulting in unlevered betas ranging from 0.24 to 0.42.

	Regression beta				
	0,38	0,47	0,55	0,64	0,73
Unlevered beta	0,24	0,29	0,33	0,38	0,42

Re-levering these asset betas at a target leverage of 40.0% generates a range of levered betas from 0.34 to 0.64, ultimately giving me a range of WACCs ranging from 3.67% to 4.73%.

	Unlevered beta				
	0,24	0,29	0,33	0,38	0,42
Relevered beta	0,34	0,41	0,49	0,56	0,64

Levered beta	0,34	0,41	0,49	0,56	0,64
Cost of equity	4,27%	4,71%	5,16%	5,60%	6,04%
WACC	3,67%	3,94%	4,20%	4,47%	4,73%

Relative valuation

	Multiple	EV / MCap
EV/ Sales (`23)	1,3x	27.418.946
EV/ EBITDA (`23)	8,3x	17.400.274
EV/ Dialysis centres	19.892,4x	83.607.617
P/ E (`23)	13,7x	6.378.313

Figure 26: Relative valuation based on peers.

Fresenius Medical Care is a provider of dialysis services and manufacturer of products, strongly focusing on the provision of dialysis treatments as demonstrated by total revenues consisting of on average of 79.2% of health care services between 2019 and 2022. There are not many listed companies that are mainly active in the dialysis business or are focusing on large-scale provision of dialysis treatments. Valuing FME based on its closest comparable, DaVita, the second largest provider of dialysis services in the United States, results in a range of enterprise values from EUR16.1bn based on EBITDA `23 to EUR30.2bn based on revenues `23. Comparing it to its peers including dialysis products manufacturers Baxter, JMS, and Nipro, EV based on revenues amounts to EUR27.4bn while EV based on EBITDA amounts to EUR27.4bn.

	Multiple	EV / MCap
EV/ Sales (`23)	1,5x	30.233.819
EV/ EBITDA (`23)	7,7x	16.103.619
EV/ Dialysis centres	5.492,5x	23.084.986
EV/ Dialysis patients	68,9x	24.454.164
P/ E (`23)	13,7x	6.369.022

Figure 27: Relative valuation based on DaVita.

It must be noted, however, that the peer group consists of corporations with different business models and differences in size. Baxter, JMS, and Nipro are the best available peers in terms of dialysis products, however, they generate only around 30% of its sales due to products related to renal care with the remaining operations being more diversified.

Price target and expected return

The DCF valuation of Fresenius Medical Care AG & Co. KGaA estimates a share price of EUR65.43 as of December 2023. As Fresenius Medical Care is trading at EUR43.76 per share as of May 12th, 2023, a "BUY" recommendation is issued, with expected returns amounting to 57.4% of the share price over the remaining year 2023, which is equivalent to an annual return of 102.2%. Expected total returns include a 54.3% increase in share price and a dividend yield of 3.1%.

Key risk

Risks

As the operation of dialysis care services depends on a large workforce, in particular health care professionals working in dialysis centres, a major risk factor is the ongoing labour shortage, putting these workers into a good bargaining position for wage negotiations. In the context of high inflation, with expected rates of around 8.0% in 2023, there is a possibility that wages for services employees increase even faster than currently expected 2% above inflation until 2026 and 1% above inflation until 2031. A scenario, in which the wages of these employees increases at 1% above the expected rates, the share price of FME would be reduced to EUR54.46, remaining everything else constant.

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Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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