



Home-deliverable antitumoral treatments in the age of COVID-19: the Portsmouth experience and a narrative review

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Background and Objective: During the coronavirus disease 2019 (COVID-19) pandemic, risks and priorities of oncologic care have required a thorough reassessment. The chance that fragile patients have exposure to infection during frequent hospital visits is an additional consideration for all therapeutic decisions. Patients with cancer, particularly those with lung cancer, have a greater chance of developing a severe form of COVID-19. Their increased risk is due to the immunosuppression associated with the chemotherapy itself, the underlying pulmonary compromise, which often accompanies lung malignancy or their general poor health. Oncology societies have given precise recommendations on the treatment modalities to be favoured, such as giving up specific palliative or adjuvant treatments, preferring shorter and less cytopenic therapies. In this review, we discussed how some of these curative treatments could be given by administering them at home. In this narrative review, we aim to see if it is safe and feasible to deliver home-administered oncologic intravenous treatments.

Methods: By narrative review, we looked for all the articles written in English describing home delivery chemotherapy or immunotherapy programs since 2019 that emerged or evolved during the COVID-19 pandemic. We added real-life data regarding the initiation of home immunotherapy in Portsmouth.

Key Content and Findings: There is a growing body of evidence supporting the safety and feasibility of home-administered chemotherapy and immunotherapy treatments.

Conclusions: Home-administered chemotherapy and immunotherapy treatments are safe and feasible despite financial challenges, particularly about reimbursement by insurance companies and the loss of earnings for hospitals. Home treatments also require the careful selection of eligible patients and the training and organisation of specialised teams capable of managing the expected complications. It would be interesting to assess the risk-reduction in terms of infections and potential survival gains obtained by these programmes during the COVID pandemic.

Keywords: Coronavirus disease (COVID); cancer; home-treatment; prevention; immunotherapy

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic has required a significant reshaping of oncological care. Patients with cancer, particularly those with lung cancer, have a

greater chance of developing a severe form of COVID-19. This risk is due to the immunosuppression associated with the chemotherapy itself, the underlying pulmonary compromise that often accompanies lung malignancy,

or their general borderline condition (1-4). Indeed, a report from the Italian Superior Institute of Health based on 3,200 patients who died of COVID-19 showed an over-representation of cancer patients, at 19.4% of the deceased (5).

The question then arose of which treatments to pursue and balancing the benefit of therapy with the potential increased risk in case of infection (6) and increased exposure to COVID-19 during visits and treatment. Several factors, including age and comorbidities and the number of hospital visits for treatment, influence this risk for each patient.

We also know that patients with cancer risk frequent hospitalisations. In the year after an advanced cancer diagnosis, about three-quarters of patients get admitted to the hospital, one-sixth more than three times (7).

While oncology societies have given specific recommendations on the treatment modalities to be favored, such as giving up certain palliative or adjuvant treatments, favoring shorter and less cytopenic treatments (3,8,9), we will discuss how to continue some of these curative treatments by administering them at home. We present the following article in accordance with the Narrative Review reporting checklist (available at: <https://med.amegroups.com/article/view/10.21037/med-21-26/rc>).

Methods

We searched in Pubmed and Google Scholar for articles in English describing home delivery of chemotherapy and immunotherapy programs since the COVID pandemic [2019] with the keywords: “home delivery”, “oncology”, “treatments”, and “COVID”. We included all studies or reports of programs that were either pre-existing or emerged during the pandemic and provided information on safety and patient satisfaction. We excluded articles about home delivery of oral treatments or those about home care in general. We also searched the reference lists of included papers.

Thus, we selected two studies from 125 articles screened. Two other programs were found by looking through references. We added a real-life experience from a home immunotherapy program in Portsmouth, allowing us to have more details on the characteristics of patients and practical modalities of such programs (*Table 1*).

Background and narrative review

Several models for administering oncological treatments

at home exist, with different levels of organisation and challenges related to the delivery of oral therapies, immunotherapy or chemotherapy (10).

Some oral treatments are easily accessible in local pharmacies, such as breast or prostate cancer hormone therapy. Most novel targeted treatments are oral and deliverable in hospital pharmacies (11). Regarding intravenous anticancer treatments, like chemotherapies or immunotherapies, their home administration on a large scale is rare, apart from 5-fluoro-uracil pumps or the availability of oral formulations like for the vinorelbine or etoposide used in selected patients (12,13).

These home treatment programs have existed for a long time and have proven their safety and utility (14). Their primary goal is to improve the quality of life of cancer patients, primarily in the areas of palliative care and paediatrics.

Since the COVID-19 pandemic, these programs, when already in place, have experienced a real boom, or their implementation has been considered to reduce the number of hospitalisations, visits, and the inherent risk of infection those entail.

Recently, recommendations were issued by various oncology societies (3,8,9) and the entire scientific community (7,15,16) to address the issue of continuity of care in a population that has to come and go to the hospital, with a non-negligible risk of exposure.

Previous studies have already tested the feasibility, safety and economic impact of home-based chemotherapy administration. A systematic review was published in 2016 by Evans *et al.* (17), assessing 54 studies in 4 different countries. Results supported the provision of home-based chemotherapy as a safe alternative to hospital-based therapy. It also gave detailed information on the other chemotherapies administered, patient eligibility criteria, delivery structures and processes, organisational and financial challenges.

In this manuscript, we will describe different preexisting programs that emerged or evolved during the COVID pandemic. We will not develop the feasibility of home-delivered oral treatments, as these are already well established.

In Italy, two programs have been described in a pediatric population. One in Friuli Venezia Giulia (18), that existed before the pandemic. Thirty-five patients received 419 doses of intravenous chemotherapy at home (cytarabine, vincristine, vinblastine). No acute adverse events were reported. Most patients families were satisfied, citing the possibility of

Table 1 The search strategy summary

Item	Specification
Date of search	January 2021 New searches from July to October 2021
Databases and other sources searched	PubMed Google Scholar Google Manual searches of the reference lists of included articles
Search terms used	“home delivery” “oncology” “treatments” “COVID”
Timeframe	January 2021 New searches from July to October 2021
Inclusion and exclusion criteria	Included: Studies or reports of programs Written in English Either existed for several years or emerged during the COVID pandemic [2019] Provided information on safety and patient satisfaction Excluded: Articles about home delivery of oral treatments Articles about home care in general
Selection process	Articles selected by first author Portsmouth experience brought by the team of Portsmouth (Harliana Yusof) Discussed with last author Approved by all the authors

COVID, coronavirus disease.

maintaining a domestic routine and reducing hospital access time and financial burden. The sample covered years between 2011 and 2019, and the pandemic COVID-19 hit Italy during data collection and analysis. The authors did not give detailed information on how COVID-19 impacted the program but affirmed that it was beneficial.

The second study, based in Padua, offers more information on the impact of such a program during the pandemic. It had a cohort of 44 patients where 18 chemotherapy infusions of vincristine and cytarabine were administered without significant problems. This allowed a decrease of hospital visits by 15% and up to 25% during

the critical weeks of the pandemic. No patient or nurse was infected either (19).

In early 2020, 600 chemotherapy visits shifted into patients homes in southern Australia via the expansion of an existing arrangement between a public hospital network and an established private home chemotherapy service. The authors explain that it proved to be a safe and efficient transition despite calls for caution from some oncology organisations. The program details are unfortunately not yet available, as the authors have only published the abstract (20).

The most detailed study on the subject is the Penn Home Infusion Therapy Program report (21) which included

Table 2 Home-immunotherapy patient characteristics (N=43)

Characteristics	No.	% or (range)
Age, median	71	[46–86]
Gender, male/female	25/18	58/42
Tumour: lung/melanoma/renal	14/25/4	33/58/9
Stage III/IV	9/34	21/79
At-risk metastases: bone/brain	9/3	21/7
ECOG PS 0/1/2	12/24/7	28/56/16
Comorbidity		
Autoimmune	4	9
CVD ^a /COPD/T2DM/others	24/8/3/25	56/19/7/58
≥2/≥3	21/8	49/19
Pretreatment steroids	6	14
NLR, median	2.6	(1.2–12.1)
≥4.0	13	30
PD-L1		
≥50%/≥1–50%/<1%	14/1/4	33/5/21
NA	24	56
ICI: Atezo/Nivo/Pembro	2/24/17	5/56/40
ICI schedule: 2-/3-/4-/6-weekly	2/4/23/14	5/9/53/33
Treatment line		
Adjuvant/first line/≥2 line	4/35/4	9/81/9
Following chemotherapy	6	14

^a CVD includes: 12 hypertension, 2 atrial fibrillation. No. number; ECOG PS, Eastern Cooperative Oncology Group Performance Status; CVD, cardiovascular disease; COPD, chronic obstructive pulmonary disease; T2DM; type-2 diabetes mellitus; NLR, neutrophils-to-lymphocytes ratio; PD-L1, programmed cell death-ligand-1; NA, not assessable; ICI, immune-checkpoint inhibitor.

an initial cohort of 39 patients treated at home for their cancer. They initially reported several obstacles to include patients, such as prejudices linked to the hospital exclusivity of oncological treatments, the difficulty in identifying the subtypes of patients eligible for such a program, or the administrative barrier with complexity and time burden of organising these home treatments. As of March 2020, during the COVID pandemic, patient inclusion rose by 700%, and the majority of the biases mentioned above were assuaged. Drugs such as pembrolizumab for lung

cancer and head and neck cancers, rituximab and EPOCH (etoposide, vincristine, doxorubicin, cyclophosphamide, and prednisone) for lymphomas and bortezomib for myeloma have been successfully administered.

Real-life data regarding initiation of home immunotherapy during COVID period in Portsmouth

In Portsmouth, during the COVID-19 pandemic, 43 patients with lung cancer were treated with either atezolizumab, pembrolizumab or nivolumab at home. A nurse team offered patients home-based administrations of immunotherapy after receiving at least two cycles at the hospital. After that, they were asked to confirm their preference about continuing treatment at home or in the hospital setting. Before each administration, the physician performed a telephone consultation, and a blood test was organised at home with a district nurse. A 24 h emergency contact number was provided to the patients within the Acute Oncology departmental service.

Among patients, 80% had a stage IV disease (21% and 7% with bone and brain metastases, respectively): 72% had a performance status of 1 or higher; 21% had two or more comorbidities [an autoimmune disease in 9%, cyclophosphamide, vincristine, dacarbazine (CVD) and chronic obstructive pulmonary disease (COPD) in 56% and 19%, respectively]. Only 24% of patients had progressive disease as the best response. This excellent result could stem from a selection bias, excluding patients with early symptomatic progressive disease (PD) from home-based options.

Long interval schedules were mostly used in immunotherapy regimens, with 4- and 6-weekly dosages in 53% and 33%, respectively. Most (81%) of the treatments were first-line palliative treatments, and only 9% followed chemotherapy (*Table 2*).

In terms of toxicity, there were 47% grade 1/2 and 7% of grade 3/4 immune-related adverse events.

The average time to switch to home treatment was 5.1 months (range, 0.9–22.7 months), 5% of the patients discontinued due to toxicity, no conversion to hospital-based administration was observed, and 100% of the patients preferred home-based treatments (*Table 3*).

This real-world experience proves that home-based administrations are feasible and convenient, particularly in patients with poor performance status, comorbidities and those with at-risk metastases (bone, brain). The strategy of delaying home-based administrations after at least two previous hospital-based doses appears sensible to reduce the

Table 3 Home-immunotherapy patient outcomes (N=43)

Parameters	No.	% or (range)
Treatment duration, months		
Since treatment start	14.2	(3.9–38.8)
Since the switch to home	8.9	(1.0–19.0)
Time to switch to home	5.1	(0.9–22.7)
Best disease response ^a		
CR/PR	18	42
SD	13	30
PD	10	23
NA	2	5
Treatment discontinuation	8	19
PD/toxicity	6/2	14/5
G1/2 irAEs	20	47
Skin	11	26
Thyroid	6	14
Colitis	5	12
Joint pain	3	7
Fatigue	2	5
Lung	1	2
Renal	1	2
G3/4 irAEs	3	7
Skin	2	5
Joint pain	2	5
COVID-19 PCR swab: negative/positive	43/0	100/0
ICI converted to hospital	0	0
Home preference ^b	43	100
Death: PD	8	19

^a, referred to RECIST 1.1 criteria; ^b, patients were asked after two administrations to confirm their preference whether continuing with home- or hospital-based administrations. No. number; CR, complete response; PR, partial response; SD, stable disease; PD, progressive disease; NA, not assessable; irAE, immune-related adverse events; ICI, immune-checkpoint inhibitor.

risk of reactions.

Conclusions

Amid all the panic and suffering spread by COVID-19,

a silver lining is that it has highlighted the added value of home treatment programs. Concerns remain about managing complications (22,23), but a review by van Tiel *et al.* shows that cytopenic patients could benefit from home chemotherapy without additional complications (24). Financial challenges remain, particularly on reimbursement by insurance companies and the loss of earnings for hospitals. The rules and impact will differ in each country. We know that these programs could benefit large recruitment centers that could provide more treatments to more patients than small recruitment centres that already lack patients and could suffer from over-staffing and financial woes without their patient base.

Home treatments also require the careful selection of eligible patients and training and organisation of specialised teams capable of managing the expected complications.

It would be interesting to assess the risk-reduction in terms of infections and potential survival gains obtained by these programmes during the COVID-19 pandemic. To do this accurately, prospective studies are warranted.

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Footnote

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